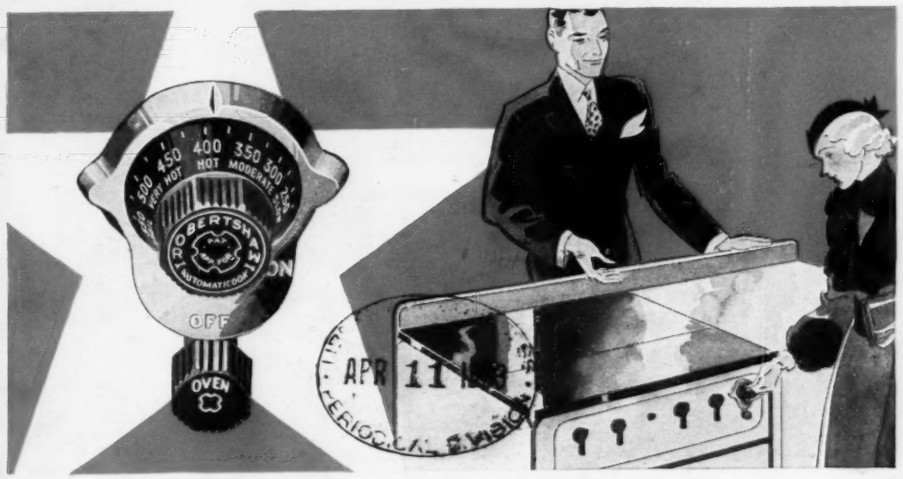
WESTERN GAS

April 1933

20 Cents the Copy

YOUR STAR SALESMAN



SHOW the Robertshaw . . . and the range is more than half sold.

NEW

Model "F" Combination Thermostat and Oven Valve. Both units—grouped together for convenience and attractive design—are entirely separate in operation and adjustment.

The records prove it. Over 1,700,000 Robertshaw equipped ranges are now in use. And every one of them is still doing a selling job . . . for the woman who has a Robertshaw is constantly telling her friends about it.

Women today, more than ever before, want the freedom of Robertshaw automatic oven control . . . the relief from kitchen drudgery . . . the certainty of trouble-free performance that is only assured by a *genuine* Robertshaw.

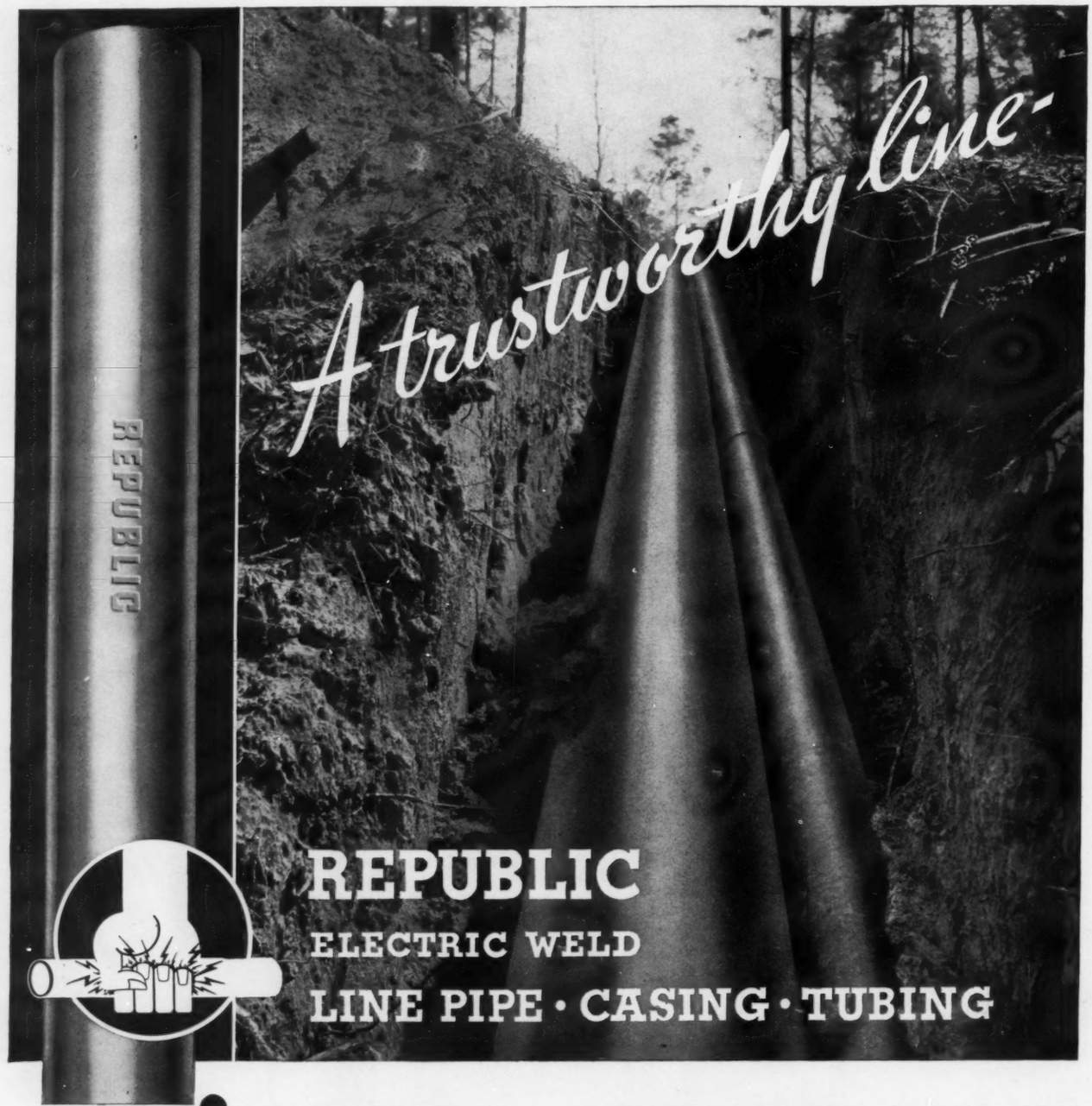
Your best selling plan this year is to push the ranges you have faith in . . . . the Robertshaw equipped ranges that you know will give continuous satisfaction and keep free from costly service charges.

ROBERTSHAW THERMOSTAT COMPANY • YOUNGWOOD, PA.

ROBERTSHAW

"AutomatiCook"

A MONTHLY JOURNAL DEVOTED TO THE WESTERN GAS & APPLIANCE INDUSTRIES



Some time ago the oil publications carried a note to the effect that the Fredell Construction Company, Denver, was installing for the Sinclair Pipe Line Co. 88 miles of 12-inch line from Troup to connect at College Station (Mexia), Texas, with the Pure Oil Pipe Line. No mention was made that the line was Republic Electric Weld Pipe, but it was, and it has proved a trustworthy line ever since it was placed in service.

The same qualities that built dependable performance into the earlier electric weld pipe are found in every length today. Straightness, uniform wall thickness, perfect roundness, freedom from scale inside and outside—all these are made possible by Republic's patented process of electric welding, which also insures a weld as strong as the wall itself. Uniform wall thickness and roundness mean easier field welding. Long lengths may almost halve the number of field welds. Absence of scale means a cleaner line.

Catalog 210-B tells the story of this better pipe, shows the results of many tests and contains data of value to every engineer interested in line design and construction. A copy will be sent without charge upon request.

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

Announcing

NEW *Air-Cooled*

ELECTROLUX

THE *Gas* REFRIGERATOR

IT USES NO WATER

"IT IS NOW CERTAIN THAT A TINY GAS FLAME WILL OPERATE THE REFRIGERATORS OF AMERICA"

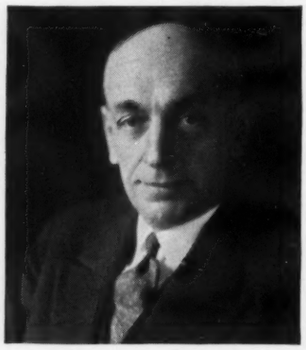
April, 1933. Volume IX, Number 4. Western Gas is published by Western Business Papers, Inc., at 810 South Spring Street, Los Angeles, California. Subscription price (in advance) 20 cents the copy; $2.00 per year; 2 years, $3.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, under the Act of March 3, 1879.

An Important Statement concerning the NEW ADVANCE *in* ELECTROLUX

by Herbert H. Springford

President

Electrolux Refrigerator Sales, Inc.



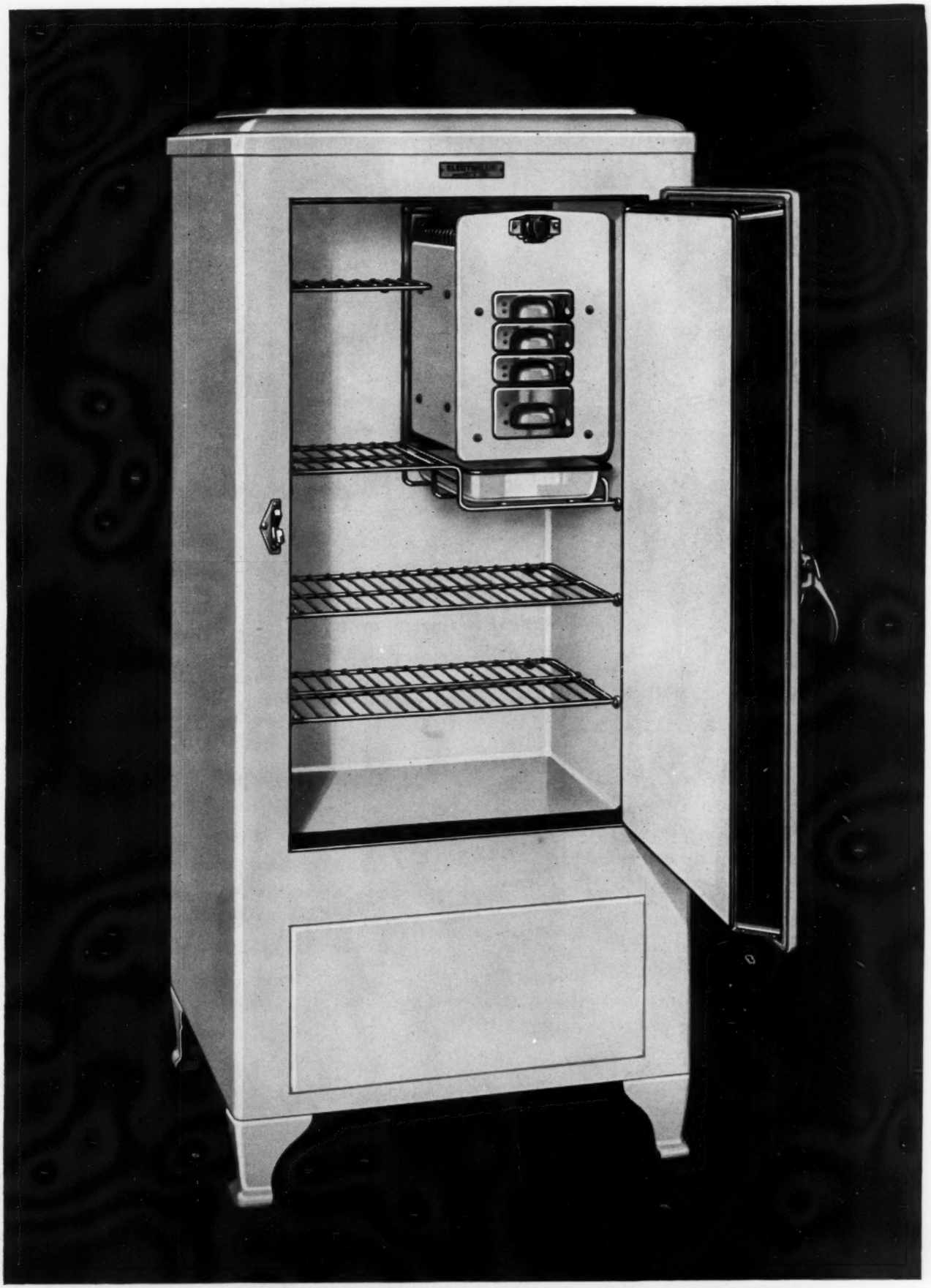
NOT SINCE the introduction of the original Electrolux refrigerator, seven years ago, have we had such a momentous announcement to make to the gas industry. We believe beyond a doubt that the New Air-Cooled Electrolux offers the very finest automatic refrigerator that money can buy today. It represents the furthest advance made by *any* refrigerator manufacturer in the achievement of economical, silent refrigeration. And its widespread use should promote an even greater public acceptance for gas as the modern fuel.

Always confident that the absorption principle of refrigeration was the simplest and most satisfactory known to science, we have in this new advance in Electrolux achieved an even greater simplicity. A simplicity especially valuable to the gas company. The New Air-Cooled Electrolux *uses no water* . . . requires only a single simple connection for gas.

We have been ever grateful for the support which gas companies have given us in the past. Today, more than a quarter of a million Electrolux refrigerators are building good-will and gas-user satisfaction. We say without fear—with perfect confidence in our prediction—that increased effort and support of Electrolux during 1933 will return even greater profits and prestige for individual gas companies and for the gas industry as a whole. We hope you will sincerely share our enthusiasm when we say, "Here is an appliance which the gas companies can be justly *proud* to offer to their customers."

IT USES NO WATER

"IT IS NOW CERTAIN THAT A TINY GAS FLAME WILL OPERATE THE REFRIGERATORS OF AMERICA"



THE FINEST REFRIGERATOR THAT MONEY CAN BUY

How the New Air-Cooled Electrolux

CUTS YOUR SERVICE

Increases Your Net Profits

by F. E. Sellman

Vice-President in Charge of Sales

Electrolux Refrigerator Sales, Inc.

FOUR IMPORTANT THINGS make the New Air-Cooled Electrolux of vital interest in the sales planning of every gas company in 1933.

First: The New Air-Cooled Electrolux reduces your installation costs. There is only one connection necessary—a pipe to the gas line. With flexible copper tubing this is a simple matter. Installation costs with the New Electrolux are 50 per cent less.

Second: The New Air-Cooled Electrolux cuts your service costs. Without doubt, a majority of the service costs on the water-cooled Electrolux were due to unfavorable water conditions. These are now entirely eliminated. Because the New Electrolux is air-cooled, and hence uses no water, your service costs are reduced approximately half.

Third: The New Air-Cooled Electrolux is easier to sell. Not only will the use of water—which in some localities was a disadvantage—be entirely eliminated, but the new simplicity of Electrolux insures owners of even More Economy, More Silence (if anything could be more silent than Silent), More Lasting Satisfaction. All this—plus

IT USES NO WATER

"IT IS NOW CERTAIN THAT A TINY GAS FLAME WILL OPERATE THE REFRIGERATORS OF AMERICA"

COSTS IN HALF . . . .

the many other valuable features (noted in detail in the column to the right)—make the New Electrolux the biggest refrigeration value for any family. Yet prices are lower than ever before!

Fourth: The New Air-Cooled Electrolux means even greater profits from the gas load. With installation costs reduced 50 per cent; with service costs cut in half; with greater consumer acceptance and appeal, which mean more sales, the load from the New Air-Cooled Electrolux will be definitely more profitable. Every Electrolux installed consumes 1500 cu. ft. of manufactured gas every month. It's a 24-hour-a-day, all-year-round load that takes the small convenience user out of the non-profit class.

If you agree that the New Electrolux offers you important sales advantages—if you agree that 1933 is the time you should get behind Electrolux for greater profits and increased load—then don't delay in getting in touch with us at once. And, having taken this important step, make your plans right away to get behind Electrolux during this spring season with special sales effort. We are paving the way for your work with extensive advertising and sales promotion. We'll gladly co-operate to put *your* program into immediate effect. Just write, wire or phone Electrolux Refrigerator Sales, Inc., Evansville, Indiana.

QUICK FACTS *about* ELECTROLUX

1. **Costs less to operate**
2. **Permanently silent**
3. **No moving parts**
4. **Temperature regulator for quick freezing**
5. **Two-temperature evaporator**
6. **Constant, steady cold**
7. **Non-stop defrosting**
8. **Trigger-release trays**
9. **Split shelves**
10. **Uses no water**

Millions of Gas Users the Country

Will Read the Story of

MORE ECONOMY
MORE SILENCE
MORE LASTING SATISFACTION

with the New

AIR-COOLED ELECTROLUX

THE NEW Air-Cooled Electrolux is big news! We're going to see that hundreds of thousands, yes, millions of gas users throughout the country—your customers among them—will hear about the New Air-Cooled Electrolux. We're telling them what an amazing refrigerator Electrolux is. We're telling them that they can "Expect More" from this refrigerator . . . more economy . . . more silence . . . more satisfaction . . . and then to even EXPECT MORE. Because the New Air-Cooled Electrolux *will* give them MORE! And that's why these advertisements are going to pave the way for more sales for you . . . more additions to your gas load . . . more profits for you.

Everything is pointing to a banner year for Electrolux sales. All we need is your co-operation in your town. Plan your sales effort now . . . take advantage of the Electrolux co-operative plan for local newspaper advertising . . . send out these convincing mailing pieces. Make 1933 a historic year for the Gas Industry and Gas Refrigeration. Write Electrolux Refrigerator Sales, Inc., Evansville, Ind.

IT USES NO WATER

"IT IS NOW CERTAIN THAT A TINY GAS FLAME WILL OPERATE THE REFRIGERATORS OF AMERICA"

Over, Your Customers Among Them,

THE SATURDAY EVENING POST
Collier's 5¢ a copy
TIME
The Weekly Newsmagazine
EXPECT MORE
From a Refrigerator this Year
ELECTROLUX
now AIR-COOLED
Uses No Water
EXPECT MORE
EXPECT MORE
of Electrolux
EXPECT MORE
You will GET it
Announcing the new
AIR-COOLED
ELECTROLUX
at new Low Prices
Uses no Water
DEALER'S
DEALER'S NAME
Arresting Electrolux advertisements appear in the above magazines . . . millions of messages telling gas users the country over to "go to their local gas company showrooms and see the New Air-Cooled Electrolux."
Advance News from your Gas Company
Colorful, convincing Electrolux literature for you to send to your prospects. No woman or man will put these pieces down without looking at them from beginning to end. The amazing story of the New Air-Cooled Electrolux told in words and pictures.
AIR-COOLED ELECTROLUX is Big News!
TODAY... and YEARS from TODAY you'll
here's a way to SAVE MONEY on refrigeration
NEW Air-Cooled ELECTROLUX

What Prominent Men in the Gas

AIR-COOLED

OSCAR H. FOGG
Consolidated Gas Company, N. Y.

GAS REFRIGERATION HAS ALREADY BEEN A VERY EFFECTIVE LOAD BUILDER AND HAS PROVIDED FOR THE INDUSTRY ANOTHER MEANS OF RENDERING TO OUR CUSTOMERS ECONOMICAL AND EFFICIENT SERVICE STOP THE ELIMINATION OF WATER IN THE NEW AIR COOLED REFRIGERATOR WITH ITS OTHER SIMPLIFICATIONS STRENGTHENS THE INDUSTRY'S ABILITY TO RENDER A FURTHER IMPROVED AND MORE ECONOMICAL SERVICE.

●

CLIFFORD E. PAIGE
Brooklyn Union Gas Company

MESSAGE RECEIVED ALSO JOLT STOP AIR COOLED GAS REFRIGERATOR IS AS MUCH OF AN IMPROVEMENT OVER PRESENT TYPE AS GAS REFRIGERATION IS AHEAD OF ALL OTHER KINDS STOP OPERATION OF OLD TYPE IS WONDERFUL STOP AIR COOLING NOT ONLY IMPROVES OPERATION BUT ELIMINATES THE ONLY DIFFICULT PROBLEM OF INSTALLATION.

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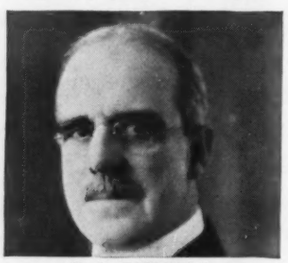

T. V. PURCELL
Peoples Gas Light Company

CONGRATULATIONS YOUR NEW AIR COOLED ELECTROLUX IS THE MOST OUTSTANDING DEVELOPMENT IN MECHANICAL REFRIGERATION SINCE THE ADVENT OF THE GAS REFRIGERATOR STOP OUR SELLING ORGANIZATION IS TREMENDOUSLY ENTHUSIASTIC ABOUT YOUR NEW PRODUCT AND WE ARE GOING TO REVISE RIGHT AWAY AND UPWARDS OF COURSE OUR REFRIGERATOR SALES ESTIMATES STOP YOUR LATEST CONTRIBUTION TO THE ADVANCEMENT OF THE GAS INDUSTRY IS TIMELY AND OF GREAT VALUE.

●

B. H. GARDNER
Columbia Engineering & Management Company

THE NEW AIR COOLED GAS REFRIGERATOR IS THE MOST STARTLING DEVELOPMENT THE GAS INDUSTRY HAS EVER HAD AND IT WILL PROVE TO BE A GREAT BLESSING TO THE AMERICAN PUBLIC FURNISHING PERFECT CARE FREE REFRIGERATION AT A COST THAT CAN BE PROVIDED FOR IN ANY BUDGET STOP IT IS NOW CERTAIN THAT A TINY GAS FLAME WILL OPERATE THE REFRIGERATORS OF AMERICA.

IT USES NO WATER

"IT IS NOW CERTAIN THAT A TINY GAS FLAME WILL OPERATE THE REFRIGERATORS OF AMERICA"

Industry say about the New . . .

ELECTROLUX

WALTER C. BECKJORD
Chair'n Commercial Sect., A.G.A.
Boston Consolidated Gas Company

THE NEW AIR COOLED ELECTROLUX REFRIGERATOR IS AN IMPORTANT STEP IN THE MARCH OF PROGRESS OF THE GAS INDUSTRY IN SERVING THE PUBLIC STOP REFRIGERATION HAS RECEIVED BROAD CUSTOMER ACCEPTANCE AND THIS NOW PLACES THE GAS INDUSTRY IN A POSITION TO DOMINATE THE MARKET STOP THE SUPERIOR ECONOMY LACK OF NOISE AND RAPIDITY OF FREEZING ARE ALL MAJOR ARGUMENTS IN ITS FAVOR STOP GAS REFRIGERATION SHOULD BE AGGRESSIVELY PROMOTED BY GAS UTILITIES BECAUSE IT ROUNDS OUT THE COMPLETE GAS KITCHEN AND DEMONSTRATES THE FLEXIBILITY AND CONVENIENCE OF GAS SERVICE.

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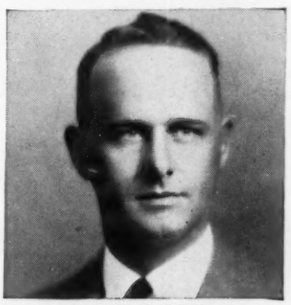

F. M. BANKS
So. California Gas Company

BELIEVE NEW AIR COOLED ELECTROLUX HAS ALMOST UNLIMITED SALES POSSIBILITIES STOP PLANS NOW BEING DRAWN FOR EXPANSION OF OUR SALES ORGANIZATION TO ACQUAINT PUBLIC AS QUICKLY AS POSSIBLE WITH NEW LOW PRICES AND ADVANTAGES OF AIR COOLING STOP OUR 1932 SALES SHOWED SUBSTANTIAL INCREASE OVER 1931 AND WE EXPECT 1933 RESULTS TO FAR SURPASS THOSE OF 1932 STOP IN MY OPINION THE NEW ELECTROLUX IS OF OUTSTANDING BENEFIT TO GAS INDUSTRY AND PUBLIC ALIKE.

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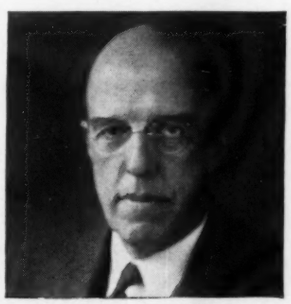


M. L. SPERRY
Washington Gaslight Company

THE GAS INDUSTRY HAS LOOKED FORWARD TO THE DEVELOPMENT OF THE AIR COOLED REFRIGERATOR AS A MYTHICAL PROMISE STOP ITS MATERIALIZATION MEANS MUCH TO THE ACCEPTABILITY OF GAS AS THE MODERN FUEL WHICH FREEZES BY HEAT.

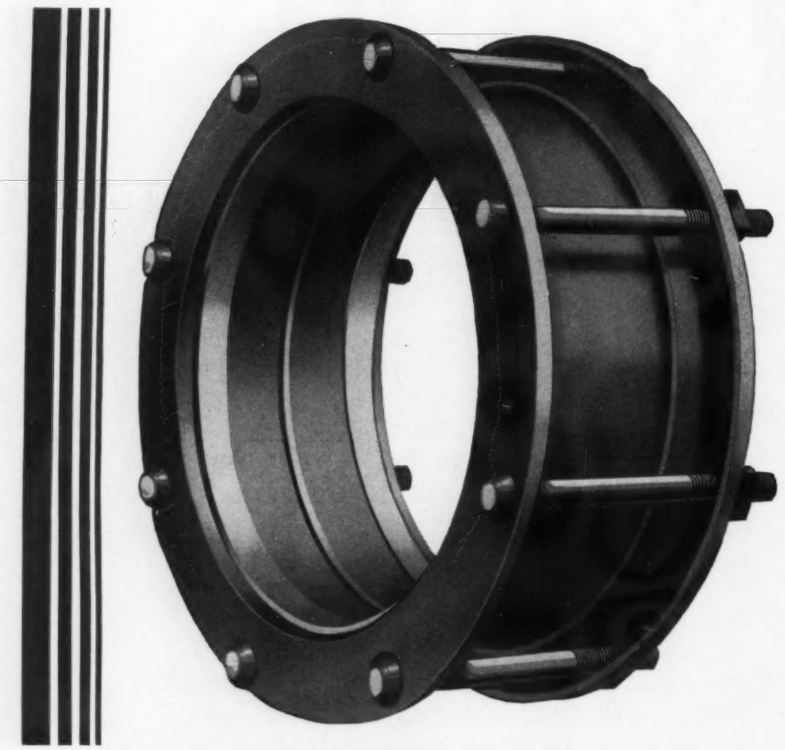
●

CYRUS BARNES
Chair'n Refrig'tion Comm., A.G.A.
Charles H. Tenney & Company

THE NEW AIR COOLED ELECTROLUX GAS REFRIGERATOR IS VITAL TO THE GAS INDUSTRY IN DEVELOPING SALES OF GAS AND IN HOLDING THE PRESENT DOMESTIC GAS BUSINESS STOP THE GAS REFRIGERATOR MODERNIZES THE KITCHEN AND HOLDS THE GAS BUSINESS FOR WATER HEATING AND COOKING STOP IT IS UNSURPASSED IN THE FIELD OF DOMESTIC REFRIGERATION STOP THERE IS GREATER OPPORTUNITY TO SELL GAS REFRIGERATORS IN THE HOME THAN ANY OTHER APPLIANCES THEREFORE GAS COMPANIES SHOULD PUT THEIR MAJOR SALES EFFORT ON THE GAS REFRIGERATOR.

●

DAYTON



There is a Dayton Coupling for every pipe line service—manufactured or natural gas, oil, air, steam or water.

Over 25 years experience in the precision manufacturing of these couplings from the highest quality of raw materials insures a product of maximum dependability.

As long as the Dayton-coupled line remains in service, all connections remain strong and flexible, absolutely tight and permanently leak-proof.

THE DAYTON PIPE COUPLING CO.

DAYTON, OHIO

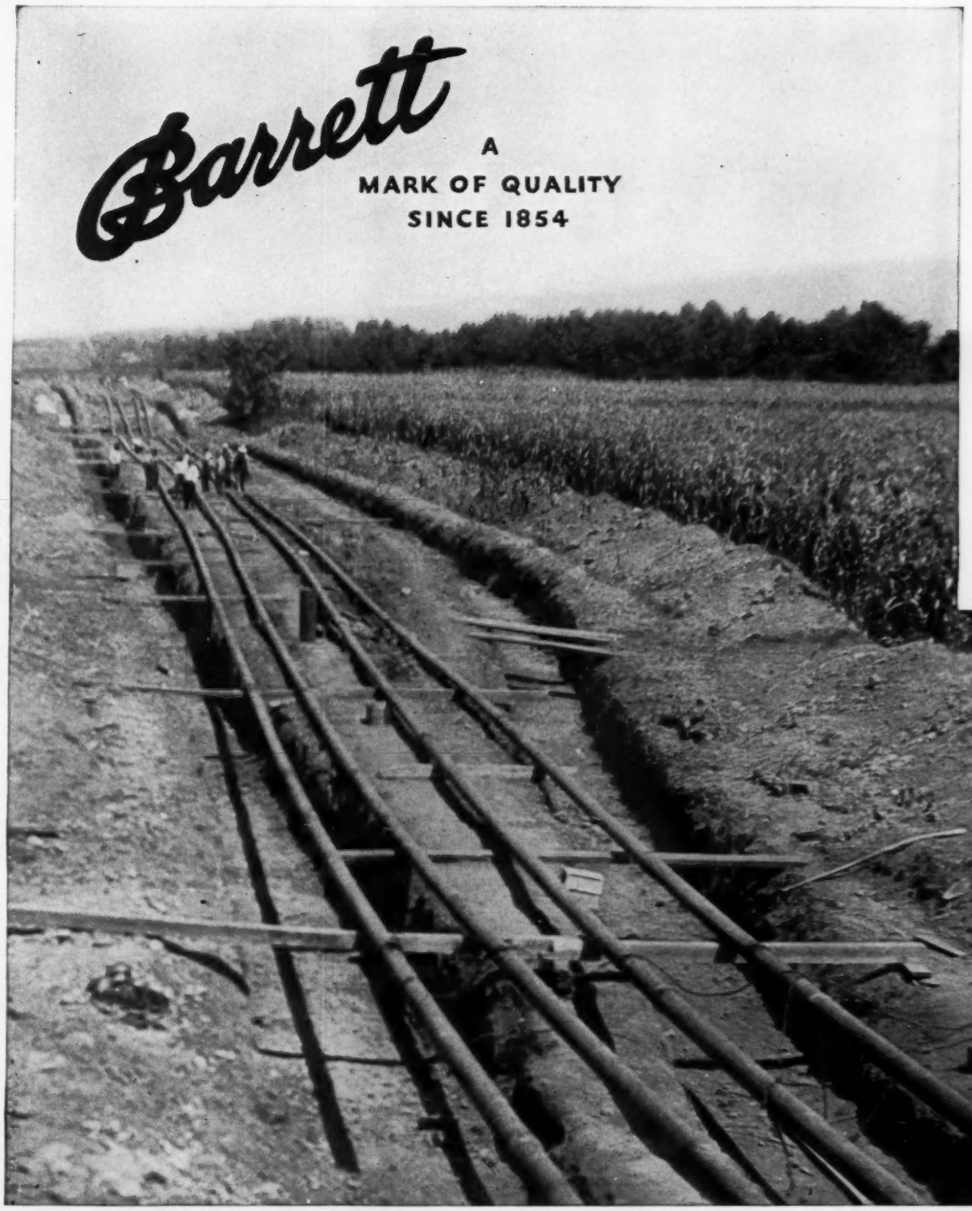
No. 9 COLLAR LEAK CLAMP

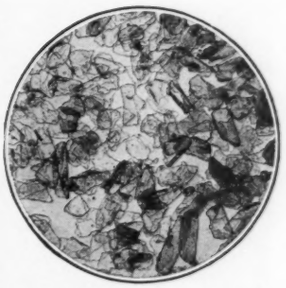
No. 2 COUPLING

No. 5 SLEEVE

No. 6 RIVER SLEEVE

DAYTON · ALL-STEEL COUPLINGS





Reproduction of the photomicrograph above shows the interlocking of the flakes of the internal reinforcement used by Barrett. By laminating with the waterproofing agent they give Barrett Pipe Line Enamels unusual toughness and resistance to soil stresses.

•

For pipe of large diameter The Barrett Company will furnish equipment required to revolve pipe and spread enamel.

Reconditioning is postponed for years when you apply

Barrett Specification

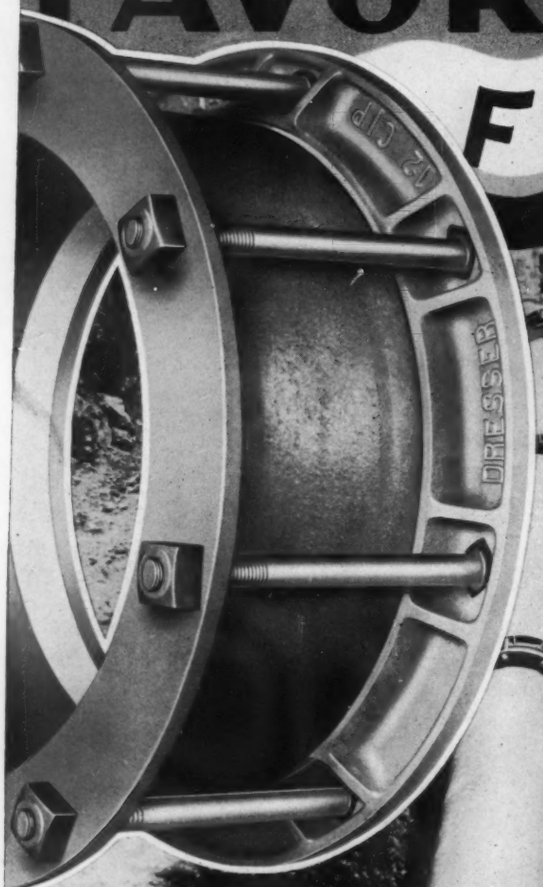
PIPE LINE ENAMELS

On new pipe lines or lines that require repair, engineers may specify Barrett Enamels with complete assurance of maximum protection at lowest possible cost. Barrett's large volume production of coal-tar pitch for all industries, plus 79 years of experience in waterproofing tunnels, dams, subways and other underground and underwater structures, are assurance of long-lasting protection—of *uniformly satisfactory* results. May our engineers cooperate with you? 'Phone, wire or write.

The Barrett Company

40 Rector St., New York, N.Y. 2800 S. Sacramento Ave., Chicago, Ill.

FAVORED *for* FLEXIBILITY ON CAST-IRON PIPE



DRESSER Couplings are the only joints that have been satisfactorily taking care of all expansion, contraction and other pipe movements for nearly half a century. On cast-iron pipe — with its rigid, unyielding structure — Dresser flexibility, and nothing less, is ample. Dresser Gaskets remain resilient for the life of the line — insuring ABSOLUTE tightness. Get prices on Style 53 Cast Couplings, available as large as 30-inch.

S. R. DRESSER MFG. COMPANY
Bradford, Pa.
In Canada:
Dresser Mfg. Co., Ltd.
32 Front Street, West,
Toronto Ontario

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PUBLICATION OFFICE·

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WESTERN GAS

"Reg. U. S. Pat. Off."

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OFFICIAL PUBLICATION:

THE PACIFIC COAST GAS ASSOCIATION

AND

THE SOUTHERN CALIFORNIA METER ASSOCIATION

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RUGGED •

The American Meter tube screw shown above interlocks with the recessed side plate. The apron cast in the screw gives a soldering surface that is gas-tight regardless of whether the soldering around the neck of the screw is tight. Leaks caused by strains in meter setting are eliminated. Gas flow is unobstructed.

The more thorough your meter records on cost and performance, the greater your proof of the accuracy and economy of American Meters.

AMERICAN METER COMPANY
INCORPORATED
Measurement and control of Gas, Oil, Steam, Air and Liquids
ESTABLISHED 1836
Meter Trade Names:
AMERICAN — D. McDONALD — METRIC — MARYLAND — PACIFIC — TUFTS
Albany Baltimore Birmingham Boston Chicago Dallas Denver Erie Kansas City
Los Angeles Philadelphia Pittsburgh New York San Francisco Tulsa

April, 1933

WESTERN GAS

"Reg. U. S. Pat. Off."

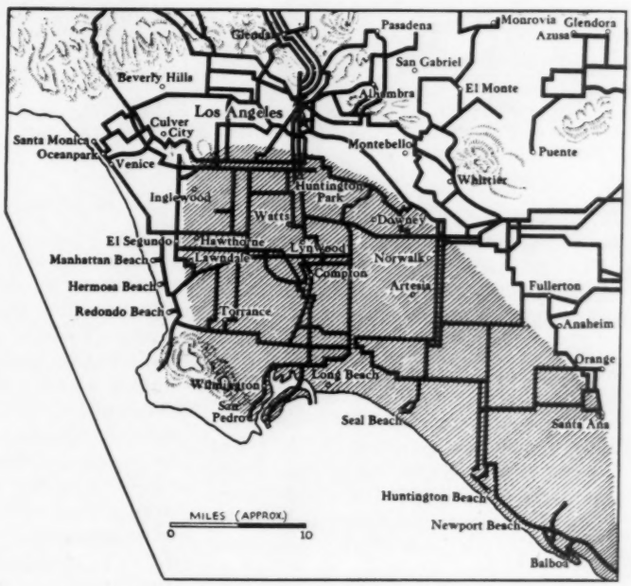
Vol. IX, No. 4

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

Gas Service.... During *and* After *an* Earthquake

By GEORGE H. FINLEY

Editor
Western Gas



SECTION OF Southern California showing area (shaded) which suffered most severe damage from March 10 shock. Lines represent principal high pressure gas system of Pacific Lighting Corp. properties in the area.

5:55 p. m., Friday, March 10 . . . and the 13 seconds immediately following, will be remembered for some time in Southern California. Over an area some 30 miles east and west and 15-20 miles north and south Mother Earth went into a violent shudder. Considerable property loss and a small death toll resulted—not a general catastrophe in any sense, but sufficient damage to summon every industry, from plate glass distributors to gas men, to marshal its forces speedily and restore the affected districts to order.

However interesting may be the general phases of the March 10 tremor in Southern California, this account is intended for gas men, and will present the facts as they have been hastily gathered together from those still busy at the job of repairing. Emergency work of course is well in the past, and how the Southern California industry handled this hurry order—virtually without accident—is a story well worth telling.

First, to briefly rough in a picture of gas facilities in the affected area:

Southern California is served almost 100 per cent with natural gas by privately operated utilities, with the exception of the City of Long Beach, which has a municipal gas department. High pressure transmission lines 12- to 26-inch, bring gas into the Los Angeles Basin area from Kettleman Hills and other San Joaquin Valley fields approximately 200 miles to the north; and from the Ventura and other coastal fields on the north and west. The above system, which carries an average load of about 135 million cubic feet daily, was unharmed. An additional 80 million cubic feet daily is supplied gas utilities in Southern California from a dozen or more fields in the Los Angeles Basin. Oil production in these fields was closed down temporarily following the quake, which threw an extra load of 45 million feet upon the lines from the north. These requirements were handled without difficulty, and no emergency gas was manufactured, though facilities were available in Los Angeles for making high B.t.u. substitute oil gas at short notice.

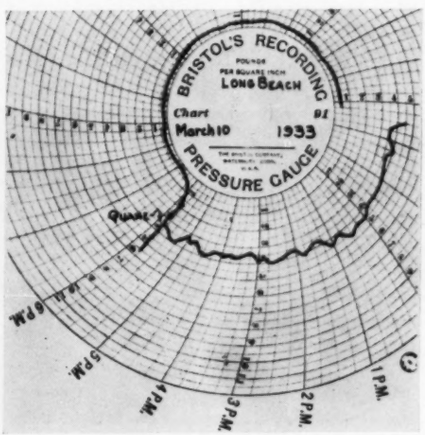
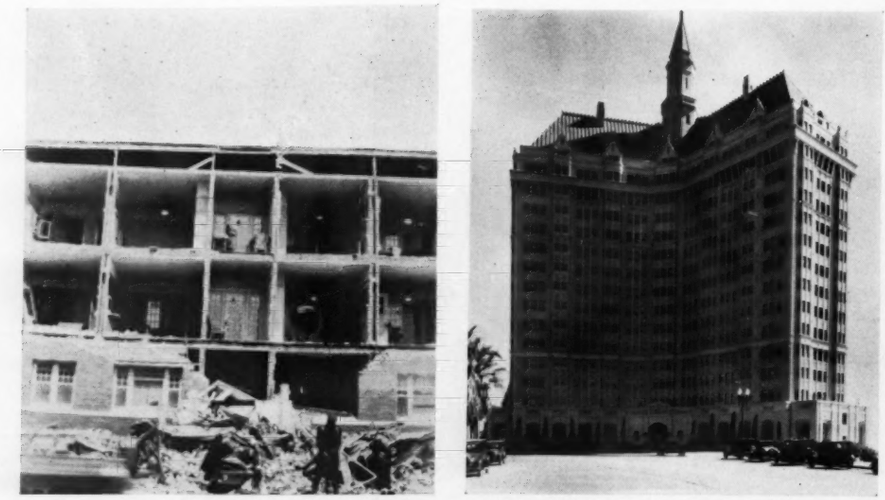


CHART FROM pressure gauge located in Public Utilities Building, Long Beach. Note how sharply gas pressures fell off.

The section in which damage was done to structures, both above and underground, as roughly defined on the map above, contains nearly 150,000 active gas meters, served by Los Angeles Gas and Electric Corp., Southern Cali-



IMPROPERLY BUILT structures felt the full force of the earthquake, while good construction stands with little damage. These views were taken within a block of each other on Ocean Avenue, Long Beach.

fornia Gas Co., Southern Counties Gas Co., and the municipal gas department in Long Beach.

Poorly built structures throughout this area in a good many cases were demolished, but adequately constructed buildings showed little effects from the strain of the temblors. Among the communities most severely hit were Long Beach, Seal Beach, Sunset Beach, Huntington Beach, Santa Ana, San Pedro, Compton, Clearwater, Lynwood, Watts, Hynes, Bellflower, Southgate, Huntington Park, Walnut Park, Maywood, Bell, Torrance, Gardena, and the extreme southern fringe of Los Angeles. Numerous breaks in transmission lines, distribution systems, house lines; damage to meters and to company buildings, took place, as will be detailed later, and about 72,000 meters were turned off throughout the section for a period of a day or more. Los Angeles and Orange counties, which together include all of the communities where damage resulted, have roughly 700,000 active gas meters, the turn-offs amounting to about one-tenth of this number.

Gas storage in the Los Angeles Basin consists of water-type, waterless-type, and high pressure holders of several designs. All of these facilities came through with virtually no damage, even in Long Beach, where injury to subsurface structures was most severe.

There is little value in generalizing on methods used by the several companies in safeguarding their consumers and reinstating service where shut-offs were necessary. In the following pages the experience of individual companies is given from word-of-mouth information supplied the writer by half a dozen or more engineers in charge of service restoration.

The Job at Long Beach

The story properly begins with Long Beach, where the largest job was to be done. The city has 150,000 population, with 46,000 gas consumers. Gas is admitted at two city-operated compressor stations, and at seven other points where natural gasoline plant lines discharge into city mains. Distribution mains total 370 miles, carrying 3 to 5 pounds pressure. The 50 miles of high pressure transmission and belt lines are in sizes from 8- to 22-inch and operate at pressures to 30 pounds. All of the distribution system up to the time of the earthquake was interconnected with the exception of North Long Beach, a community with 4,200 meters.

Immediately after the first (and most severe) earthquake, at 5:55 p.m., pressures on the Long Beach system dropped to nothing—a combination of line breakage and shut-offs at gas supply points. A 20-inch highline running from the Signal Hill field diagonally southwest through the city to the Harbor district was shattered in more than a score of places, which relieved pressures on the system greatly. At one of the compressor plants (No. 4) where there was only one set of suction and discharge valves, with the outlet valves located on the outside of the building, gas was shut off within a few seconds. At the other plant (No. 1) seven valves had to be closed, but this station was off the lines within five minutes. Likewise, prompt action was taken to close down at orifice meter set-ups, located at the seven feed points from natural gasoline plant lines. Local operators were at hand in three cases to make these turn-offs. J. B. Mosher, in charge of orifice meter measurement for the city gas department, did a Paul Revere trip calling at all seven of these plants and shutting gas off at four of them, all within an hour's time.

According to E. S. Bryant, gas engineer and assistant superintendent of the city gas department, no damage was suffered at compressor plants, engines being intact, and holder equipment also remaining fit for service. Holders were inspected almost immediately after the first shock, and it developed that the only damage was of minor nature, on the city's 10 million foot five-lift holder. Spindles on the guide rollers for the upper lift were bent outwards in a radius of 8 inches or more. This holder was built on a foundation 7 feet below ground level, which was thought to have added considerably to its rigidity. Rivets showed signs of lifting slightly on two or three plates, but this was the extent of damage to Long Beach holders.

For several years a sign has been prominently displayed on the office wall at the gas department's Plant No. 1:

NOTICE

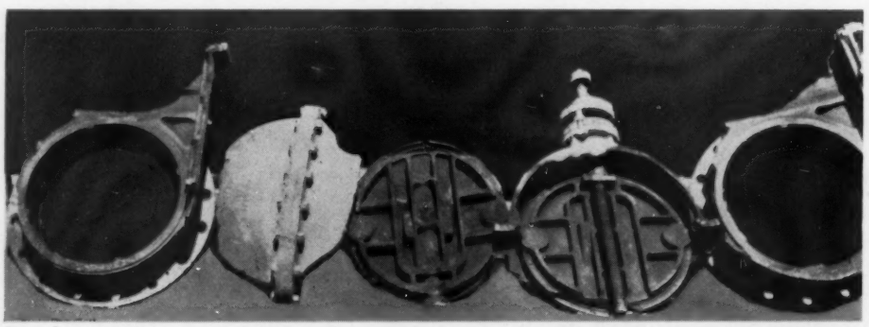
IN CASE OF EARTHQUAKE

All crews report at this office.

By order of Superintendent.

City of Long Beach Gas Department.

Even while gas was being shut off the system gas crews were hastening to this appointed station, and 15 minutes after



WHAT ONCE was an 18-in. gate valve. Flanges remained on pipe ends, but hood of valve was torn off on one side and half of the disc was thrown clear. The main was twisted laterally 4 inches out of line in both directions.

the first quake all construction crews were on deck under the direction of H. T. Eberhart, superintendent of construction.

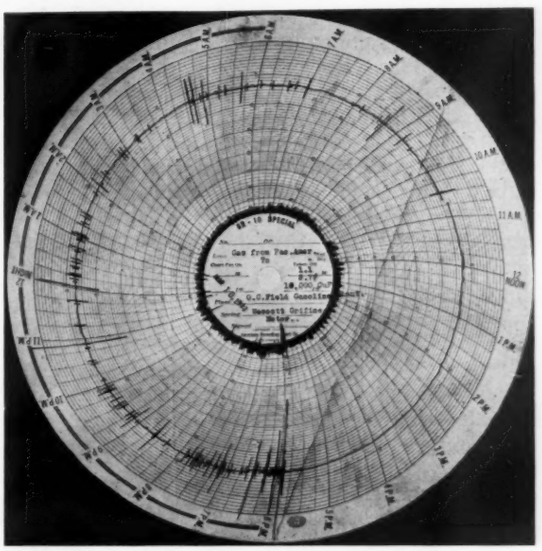
Restoration of service in Long Beach divided itself into a transmission system job and a distribution job, which will be briefly reviewed in that order below. The work proceeded under the general direction of W. H. Partridge, superintendent and chief engineer of the Long Beach Gas Department, and E. S. Bryant, gas engineer.

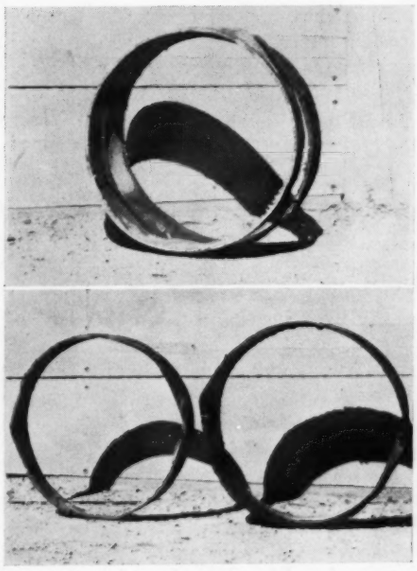
Checking high pressure transmission and feeder lines for escaping gas and consequent fire hazard was the urgent first step taken Friday night. Crews working out of Plant No. 1, about 60 strong at the outset, ran this preliminary check. First the 20-inch line referred to earlier was traversed, and

▲

This 24-hour orifice meter chart from the master gas meter of the O. C. Field Gasoline Co. at Huntington Beach, for Friday, March 10, tells the whole story of the earthquake disturbance in Southern California. Normal operation is shown up to 5:55 p.m. when the first of a series of quakes was registered. Relative severity of the shocks is shown in a general way. The first quake caused practically all of the damage suffered.

▼





Coupon from 18-inch line, taken two pipe lengths from the gate valve shown on Page 16. Upper view shows pipe ends broken at weld, as found after quake.

was found exposed at many breaks where gas pressure and earthquake combined had loosened earth and even raised pavement in some cases. High pressure feeder lines running north and south showed most damage, though there were a few lines remaining intact. Lines broke at welds in numerous locations, and many couplings pulled apart. The weld ruptures were twists as well as straight-line strains. It was often necessary to weld in pieces, sometimes 8-inch sections, to close up line gaps at breaks. Some lines showing this type of break were nine years old, indicating that the gaps were not due to line tension.

Knowing their transmission damage, construction crews went to work day and night to repair it. Up to Friday, March 24, about 170 major breaks had been located and repaired, for the most part through cutting out and welding though some breaks were handled by temporary couplings where it was essential to get gas on speedily. Acetylene and electric methods of welding were both used. Better than three-fourths of the transmission system had been restored by March 24. All sections of the city were back on gas by March 28, though work is still being done at locations where temporary repairs had been made to breaks.

Shutting off consumers' meters, repairing service and distribution line breaks, and turning on the 46,000 meters again was a monumental task, particularly since it had to be done on rush schedule without previous opportunity to lay out an organization plan. Every major gas company in Southern California offered and rendered assistance to the Long Beach municipal gas department in this phase of the restoration.

W. E. Gentner, district superintendent for the Southern Counties Gas Co. at San Pedro, was directly in charge of isolating the Long Beach system into districts and turning on meters, in cooperation with the Long Beach gas department officials.

Available for the job were about 400 men, made up of some 105 from the Long Beach department, 40 from Southern Counties Gas Co., 30 from Los Angeles Gas and Electric Corp., 20 from Southern California Gas Co., and 17 from San Diego Consolidated Gas and Electric Co. Nearly 200 men were hired locally through the Reconstruction Finance Corp. With the exception of the San Diego company all of the utilities were also repairing their own systems at the same time, though the Long Beach job was of much greater magnitude than all of the others combined. Trucks, leak detectors, and other equipment were sent to Long Beach by the various companies as work got under way.

Saturday morning following the quake the city gas department began turning off meters, and had almost completed this phase when Mr. Gentner and the other company workers came on the job Tuesday morning. Those making shutoffs were reporting all visible broken service risers, meters and regulators, and locations where meters could not be reached due to fallen or demolished buildings.

In the first 27,000 turn-offs, 509 repeat calls were necessary due to broken risers, houses demolished, etc. This 509 figure was made up as follows: Pipe broken and bent, 271; debris and house down, 140; locked premises, impossible to locate meter, cocks stuck, 98. Services were cut off at the property line when meters could not be reached.

While the overhead checking work continued, construction crews were active repairing all major breaks where mains had opened up in streets. Another main crew was used on a feeder in the west side of the city, in a 1500-meter district not badly damaged. This district was the first to be put back on gas, on March 16. North Long Beach, another isolated section, got gas on the 18th, and the first gas was turned into the downtown business district where repair operations had also been concentrated, on the same date.

Districting the City

Districting the Long Beach system for the purpose of pressure tests and gradual restoration of service was one of the important operations, begun on March 16. Three major districts were

created, each under a supervisor. W. L. McKee, leakage engineer for the Southern Counties Gas Co. had charge of the eastern district, J. L. Winesett of the Long Beach gas department the western, and A. R. Thomas of Los Angeles Gas and Electric Corp. the residential district in the north. The distribution system was segregated into 30 sections, each bounded by or including the larger feeder mains. Each supervisor in the three major districts was given five trucks and a crew to isolate the sections within his district. The "brains" of each crew consisted of the supervisor, a foreman, a welder, and two fitters. Laborers were added as needed, from half a dozen upwards to the crew.

Existing valves were used whenever possible in isolating the 30 sections. Valves in the business district were taken apart and cleaned to insure positive shut-off. Mains up to 8-inch size were cut at many points, a valve thrown in on one side and a bull-noze welded on to dead-end the other. Where gas was in the mains, up to 6-inch, the lines were cut, a valve inserted on one side and a bull-noze and coupling on the other. In restoring service after the isolation the bull-nose in such cases was pulled out and the valve connected to the main with coupling.

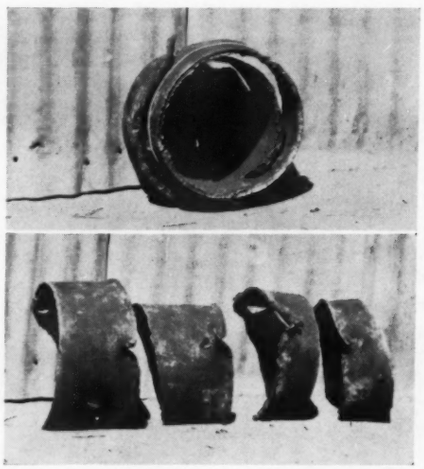
While this isolating into sections was proceeding, feeder mains were quickly being repaired under Mr. Eberhart's direction. Much of the leakage in mains was under heavy pavement, and as many as 10 compressors were working at a time throughout the city on pavement breaking. As a feeder was repaired and before gas was used off of it, it was tested with a 15,000-foot hourly capacity displacement meter. Pete Vidano, repair foreman of Southern Counties Gas Co., ran these feeder tests.

For all of the testing work on feeders and on the isolated sections, highly odorized gas was used. Two gallons of odorant to the million cubic feet is ordinarily used in Long Beach, but this was raised to 5 gallons for the test work.

When feeder lines in one of the isolated sections were intact that area was given a pressure test, also by displacement meter. R. L. Taylor, repair foreman of Southern Counties, carried on most of these tests.

One of the difficulties encountered in running pressure tests on the isolated sections came from customers turning on their own meters when they saw gas men at work in the district. These customer turn-ons, of course, could not be distinguished from leakage, and it finally became necessary to use radio and newspaper appeals asking the public to refrain from turning on meters.

Four leakage detector crews were organized, using leak detectors loaned by Los Angeles Gas and Electric Corp., and as soon as gas was in a section these crews checked all manholes and substructure vaults. They were provided with Atlas sheets on which their findings were recorded, the sheets being returned to headquarters for assignment to repair crews. Numerous broken service valves and stuffing boxes, broken pipes and small leaks which escaped the first check were thus brought to light. The individual Atlas sheets were checked out on a key sheet as they were given to detector crews.



The 10-inch steel line from which the coupon was taken (Park Ave. and Fourth St., Long Beach), separated at a weld and also split longitudinally on both sides. The four pieces of the coupon are assembled in the upper view in the position found. Back-thrust of line after pulling apart accounts for jagged cuts shown in lower close-up.

As the section tests were completed, crews were routed to turn on customers' meters. Individual meter tests were run at each customer's premises, and where damage to house piping was found the customer was advised to call a plumber. By newspaper and radio gas users were urged to inspect house piping and have plumbers make needed repairs before the turn-on crews arrived, so that it would be unnecessary to shut off meters again. From 50 to 70 plumbers were busy with house piping repairs in the city.

Incidentally, several cases occurred where unauthorized persons posing as gas company men offered to turn on customers' meters for a $1.50 charge.

Closing this hasty review of the rehabilitation program at Long Beach it is fitting to pay tribute to the Long Beach Gas Department and the many representatives from assisting companies for the quick, thorough and safe manner in which the job was handled. There were no fires or explosions on utility gas lines in Long Beach at any time.

Bottled Gas: The splendid service rendered by bottled gas companies in providing emergency gas for fuel use in hospitals, fire stations and other public aid centers, as well as in many essential commercial uses, is described in the *Butane-Propane News* department of this issue (Page 29).

So. Calif. Gas Co.'s Task

Of the three gas companies operating in the Los Angeles Basin, Southern California Gas Co's. system was most severely affected, 23,500 meters in the central and southern operating divisions being shut off. These were located in the Compton area, Lynwood, Clearwater, Bellflower, parts of Huntington Park and Bell, as well as several other communities previously named.

Following the earthquake an inspection of plant properties was at once made under the direction of Lee Holtz, superintendent of manufacture and distribution. No appreciable pressure drop showed. All water-type holders slopped water, a 3,000,000-foot holder losing about 2,000 gallons of water and oil. The piston of the utility's 10,000,000-foot waterless holder was bottomed, the rubbing bars checked, and found tight. The holder was again filled, with four men riding the piston to check top rubbing bars, after which the piston was again run down and everything found tight.

Towns were of course shut off at once at regulator stations and other feed points, and even before checking operations at the plant were completed, a crew of 275 men was busy in the damaged area making meter shut-offs. These were finished by Saturday night.

After the meter shut-offs were completed, nine crews of 20 to 30 men, each with a captain and lieutenant, were routed through the shut-off areas. Local headquarters were designated in each district, where the men received orders and used meter books. Calls were made at customers' premises, and appliances checked to see that pilot lights were out and shut-off complete. Meters were then turned on and dials watched. If house lines were tight, gas was turned on and appliances were adjusted. Breaks in house lines or appliance connections, etc., were repaired by plumbers.

To indicate the extent of damage encountered on the Southern California system there were over 100 breaks in distribution mains of all sizes. The company's transmission system came through with less than a score of breaks, which were repaired and the system closely checked under the direction of H. P.

(Continued on Page 33)

A Sales Viewpoint on Commercial *and* Industrial Installations . . .

By ROBERT L. GRUTZMACHER

Industrial Engineer
*Natural Gas Equipment, Inc.**

GENERALLY speaking, we who are engaged in the sale of natural gas or equipment for its utilization are chiefly interested in combustion efficiency rather than overall efficiency. It is apparent that though an overall efficiency test would be desirable in every case, the breadth of scope and the expense involved make it impractical. We are satisfied to make adjustments in order to obtain the maximum efficiency out of the burner and to assure us that the heat is liberated where it can be used. It is unnecessary here to go into the detail of combustion, for having a gas of known constituents it is a matter of computing chemical equations to arrive at what is called perfect combustion. From these calculations we know the maximum efficiency—combustion efficiency—that is possible, so that analyzing a sample of the flue gases and recording the temperature at the point at which the sample was taken will give us sufficient data to determine a percentage of combustion efficiency.

It is difficult, if not impossible, to make a guarantee of efficiency unless sufficient data are available on the fuel that is being burned at the time of conversion, and by sufficient data is meant the results as determined by an evaporation or weighed water test. It does not matter how efficient the burner may be; the boiler itself may be inefficient due to poor water conditions, lack of proper combustion space, etc.

Load conditions particularly affect efficiencies. Practice has shown that on H.R.T. boilers the average rating giving the greatest efficiency is 100 per cent; water tube boilers of the older types of Heine, 125 to 150 per cent rating; Stirling boilers of the older types, 140 to 175 per cent; heating boilers designed for coal, 75 per cent. On later types of water tube boilers efficiency ratings have gone up considerably. On natural draft 250 per cent rating can be handled with a high degree of efficiency, while in a few instances, with forced and induced draft and preheated air, 400 per cent rating is being handled efficiently. However, in conversion work it is not of primary concern to the gas man to become involved in overall efficiencies. He is interested in knowing that all of the available heat is liberated in the furnace and that the products of combustion travel along the exposed surfaces where the heat can be transmitted to the water, and that stack losses are reduced to a minimum. That is why adjustments made in air control are checked by an analysis.

With this preface, it is the purpose in the following discussion to treat some basic fundamentals which would decrease sales resistance for the man who understands the what and why of gas burning and gas application as it relates to commercial and industrial installations.

Burners

First, we may consider burners and their application. As we know, the two generally accepted methods of burning gas are the bunsen or venturi tube burner and the multiple jet burner. There are advocates of each particular type, but insofar as types are concerned the chief interest of this section is in the combustion efficiencies that may be obtained from a burner regardless of type. One general truth is outstanding in this connection, and has been proven repeatedly by test—that high efficiencies are obtainable with either burner, when the burners are properly sized and applied.

Some conditions in some cases are more favorable for one type of burner than the other. For example, some 300 tests show it to be apparent that the venturi type of burner requires less furnace volume and less draft than the multiple jet type. On the average, the furnace volume ratio is 1.5 cubic feet per horsepower developed with a venturi type, to 2.5 cubic feet in case of the multiple jet, and draft in inches of water from .08 in case of the venturi to .14 in case of the multiple jet.

The reasons for this differential in requirement are (1) the bunsen or venturi type, into which gas is injected through a nozzle, inspirates and intimately mixes a correct volume of primary air which is properly proportioned to the amount and velocity of the gas, and (2) the inherent feature of injection of primary air makes the bunsen type relatively independent of draft, and this in turn reduces the tendency to infiltration of air through leaks of the setting. Shown in the analysis, Table No. 1, is one of a number of instances in which a positive pressure has been maintained inside the firebox with a venturi burner.

TABLE NO. 1

(INDICATING A PRESSURE IN A FURNACE USING VENTURI BURNER)

Load	86% rating—100 HP H.R.T.
CO_2	11.6
O_2	.9
CO	.0
Excess Air	3.5
Stack °F.	347.0
Stack Draft	.01 Pressure
Gas—cu ft. per hr.	3790
Combustion Efficiency	82.7%

These facts indicate that a burner of this type in which intimate mixing of gas and air takes place before entering the combustion chamber will require less furnace volume for combustion, permitting longer and slower travel of the products of combustion over the heating surfaces of the boiler. Automatic control of the fuel being fired, which varies the gas supply in relation to the steam load, amounts to automatic control of basic

(Continued on Page 26)

* Presented before the Pacific Coast Gas Association's Organization Conference, San Francisco, Calif., December 14-15, 1932.

Cathodic Pipe Protection

by the Pacific Gas and Electric Company

By WM. R. SCHNEIDER

Bureau of Tests and Inspection
Pacific Gas and Electric Company *

TWO cathodic protection installations were placed in operation of the 20-inch main line at Mills Field, south of San Francisco in January of 1930, and one on the Napa River crossing in November of 1931. Since that time two additional installations have been made by the Bureau of Tests and Inspection on the main San Francisco line, in reclaimed tide lands at the southern end of the San Francisco Bay. The latter installations were placed about 7 miles apart, one near the City of Mt. View and one near Alviso.

The equipment installed at these locations and that described at the Pacific Coast Gas Association convention of 1931† are identical in regard to the size of the rectifier units, spacing and size of auxiliary electrodes, and current densities at the surface of these electrodes.

Smaller units for pole mounting are being designed at the Bureau of Tests and Inspection, and will be used in localities where conditions are less severe.

The locations of the drainage and cathodic protection stations are determined by a soil current survey made along a pipe line after the soil has had sufficient time to consolidate around the pipe and the pipe covering has absorbed as much moisture from the soil as normal conditions will permit. Small, weighed, steel plates or corrosion coupons are then connected to the pipe, wherever the pipe is found to discharge a current in excess of 1 milli-ampere per square foot of surface. The plates are allowed to remain for a period varying from 10 days, in very severe cases, to six months under average conditions. These plates are then removed, cleaned, weighed, and the depths of pits measured. The loss of weight and depth of pitting give a basis on which to estimate the life of the pipe, showing the amount of corrosion that is taking place at each bare spot or perforation in the pipe covering.

The data obtained from the coupon when used in conjunction with the known cost of replacing or reconditioning the pipe, will give a proper basis for determining the most economical method of affording the necessary protection against corrosion.

The length of line that can be protected by a given installation, varies with the diameter and resistance of the pipe, pipe covering resistance, and the soil resistance from the pipe to a remote point in the soil about 100 pipe diameters away.

In (a) of Fig. 1 is shown, schematically, the arrangement of the component parts of a cathodic protection installation.

In (b) and (c) of Fig. 1, are shown the pipe and soil currents on a cathodically protected pipe for two values of the combined wrapping and soil resistance.

For the purpose of illustration the covering resistance and soil resistance to a remote point will be combined and called the "leakage resistance" per unit of length of pipe.

With a low leakage resistance the current from one half of the line will be high for a given applied voltage and fall off rapidly as the distance from the drainage point increases as shown in (b).

The potential along the pipe will decrease rapidly with distance in the same manner.

If the leakage resistance is higher due to seasonal changes or the different soil of another locality, the current entering the pipe per unit length will be less and the total current returning to "A" will be lower. It will be seen, however, that the potential along the pipe does not decrease as rapidly with the distance from "A", and therefore, as a higher

† Reference: Proceedings of Pacific Coast Gas Association, 1932, Vol. No. 23, Pg. 408.

* Presented at the Spring Conference of the Pacific Coast Gas Association's Technical Section. Mr. Schneider's paper was given as a contribution of the subcommittee on Pipe Protection (O. L. Wrestler, chairman), on the March 2 program conducted by the Distribution Committee, of which F. A. Hough is chairman.

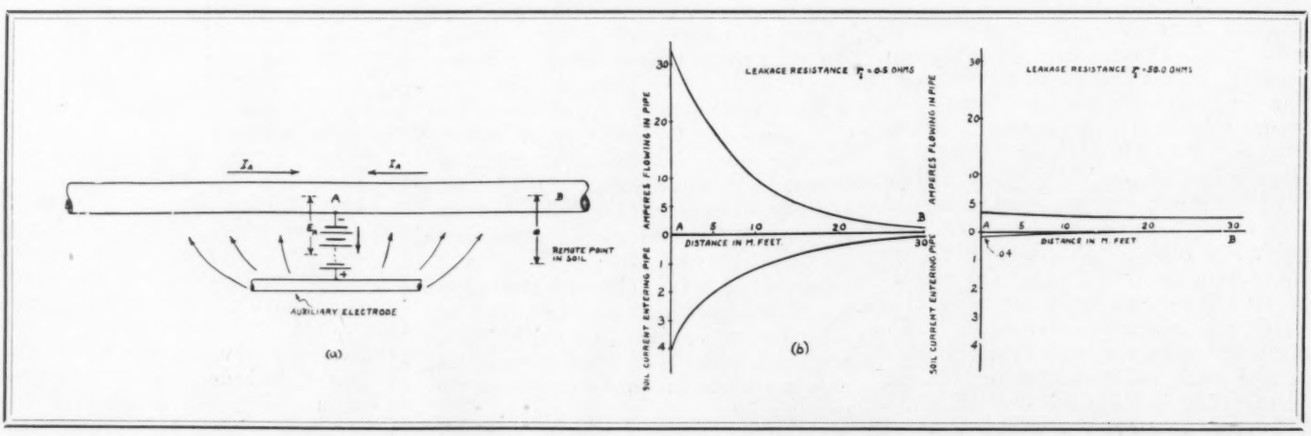


FIG. 1. Current Flowing in Pipe, 2 Volts Potential Applied Between Pipe and Remote Soil Drainage Station. Resistance of 8-inch Pipe—.00745 Ohms per Thousand Feet.

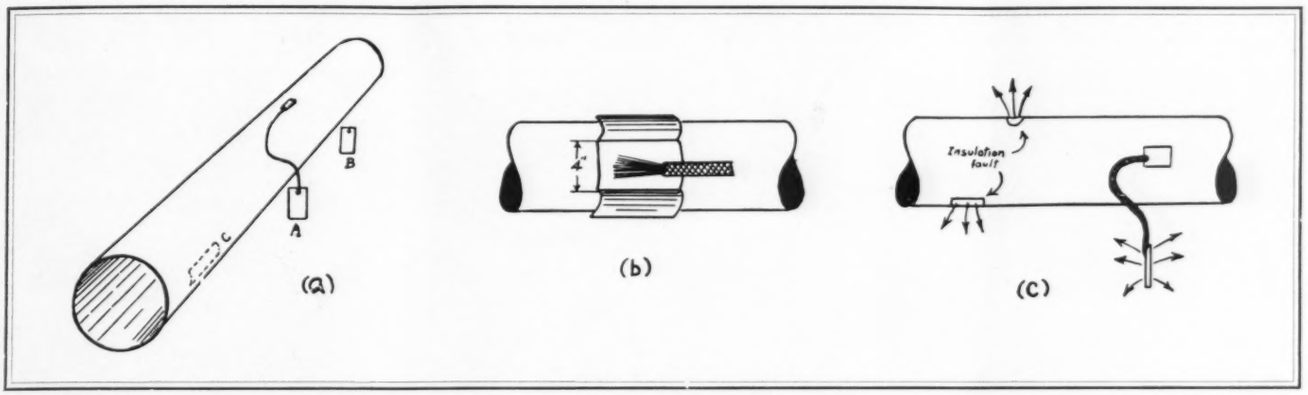


FIG. 2.

potential gradient is maintained between the pipe and soil, a greater amount of protection is given at the more distant points. The current received by the pipe per thousand feet is less, and does not reach as high a value at the drainage point as it would if the leakage resistance were low. This condition is shown in (c) of Fig. 1.

If the soil and leakage resistance is uniform over a long length of pipe, the current and potential conditions can be calculated for the pipe on each side of the drainage connection by means of the following equations, in which:

E_A = applied potential between pipe and remote ground. (Not the potential between the pipe and the auxiliary electrode).

e = potential between pipe and remote ground at any point L.

I_A = current returning to the drainage bond at "A" from one half of the pipe.

i = current at any point in the pipe.

i_s = current entering pipe per unit length.

r = resistance of pipe per unit length.

r_1 = leakage resistance of pipe per unit length.

$g = \frac{1}{r_1}$ = leakage conductance of pipe per unit length.

L = distance from "A" in units of 1000 feet or miles.

$$\Delta = \sqrt{rg}$$

and

$$R_o = \sqrt{\frac{r}{g}}$$

The current I_A arriving at "A" from one side of the drainage connection, with an applied voltage E_A, will be:

$$I_A = \frac{E_A}{R_o}$$

The current i, at point L on the line will be:

$$i = I_A (\cosh L\Delta - \sinh L\Delta)$$

and the potential between the pipe and the remote soil at any point L along the pipe will be:

$$e = E_A (\cosh L\Delta - \sinh L\Delta)$$

and $$i_s = E_A (\cosh L\Delta - \sinh L\Delta)g$$

is the current entering the pipe per unit of length from the soil.

These equations when plotted will give a graphic representation of what is to be expected under an ideal condition of uniform leakage resistance on a line of infinite length. Such an ideal condition is rarely even approximated in the field. The positive areas are usually limited to a short length of pipe, such as a submarine crossing, with comparatively dry soil on either side.

A study of these curves will show that it is not practical to attempt to protect a bare pipe line, due to the large current required and the short amount of pipe line that receives cathodic protection from a single installation.

When the question of cathodic protection was first proposed the possibility of the bond, between the pipe and the covering, being broken was considered. It was thought that the current flowing through the covering and the gases formed under it would separate the paper from the pipe and increase the amount of protective current required. To date, inspection of the wrappings has shown no cause for alarm and the amount of current required to protect the pipe, as judged by the corrosion coupons, has not been increased. Further observations and tests will be made to definitely settle this question.

A word of caution is advisable in regard to the use of this form of cathodic protection.

All other pipe and cable owning companies should be considered, as the soil current produced by this scheme may follow their conductors for a long distance and when leaving do considerable damage. The same thing applies to the networks of pipe in cities. Unless properly insulated, these networks will pick up the current and carry it to the main being protected, and in traveling over pipes with screw connections will cause considerable damage at the high resistance screw joints.

When work is being done on the gas mains the drainage system should be shut down, or a heavy bond placed around the contemplated break in the gas line to prevent the ignition of gas when making or breaking a pipe connection.

The amount of corrosion taking place on a pipe can be determined most easily by means of the corrosion plates described in a previous report.*

These coupons are installed as shown in (a) of Fig. 2 in which the 3-inch by 6-inch steel coupon "A" shows the effect of soil and stray current corrosion. The coupon "B", acting as a control, is affected by the soil corrosion only.

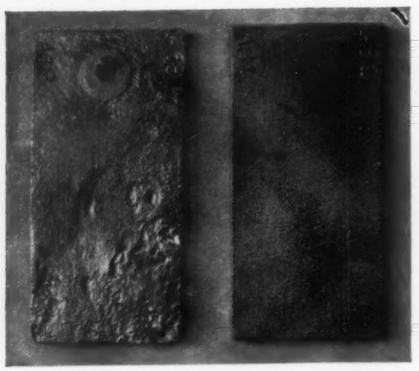
The copper cable is connected to the main by soldering in a pocket formed by rolling back the covering as shown in (b) of Fig. 2, placing paper or moist earth barriers at each end of the opening and filling the rectangular box thus formed with melted tar or asphalt. The rubber covering of the cable also terminates inside of the box of asphalt so that no copper or steel is exposed to the moisture and no local galvanic action is set up by the different metals. At the coupon the cable terminates in an iron lug which is bolted to the test plate. This bolt, lug, and one inch of the coupon are insulated to prevent local action and to definitely define the area to be corroded by the soil or current.

The reliability of the indications obtained by the use of these coupons has been tested by placing coupon "A" at different distances from the pipe and checking against a plate "C" connected to the pipe and placed on it as shown in (a) of Fig. 2. These check tests agreed in all cases within 7 per cent.

This agreement is due to the fact that the pipe being insulated does not produce a field of uniform current distribution in the surrounding soil. As shown in (c) of Fig. 2, the current is distributed in the form of a brush from each exposed spot or defect in the wrapping, and from the corrosion coupons. These points are usually comparatively far

*Reference: Proceedings of Pacific Coast Gas Association, 1932, Vol. No. 23, Pg. 408.

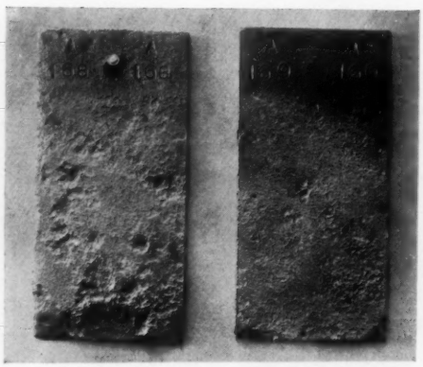
Napa River Crossing, Soscol, Unprotected—116 Days
Pipe Control



Loss per square foot per year
1328.9 grams 75.2 grams

FIG. 3-A.

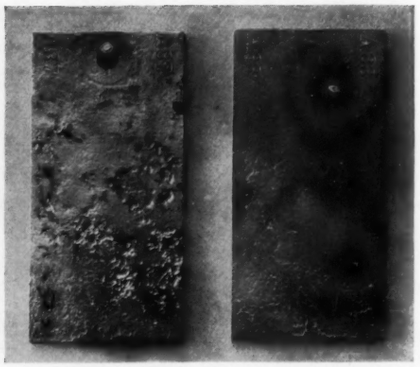
Tracy Metering Station—249 Days
Pipe Control



Loss per square foot per year
364.4 grams 100.2 grams

FIG. 3-B.

Glen Ellen—406 Days
Pipe Control



Loss per square foot per year
90.8 grams 22.16 grams

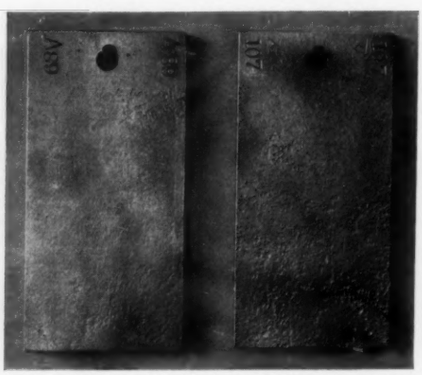
FIG. 3-C.

Shellville Station—381 Days
Pipe Control

Loss per square foot per year
12.84 grams 53.40 grams

FIG. 3-D.

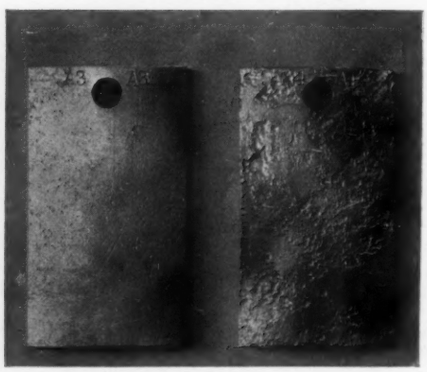
Santa Rosa—Sebastopol Line—407 Days
Pipe Control



Loss per square foot per year
13.08 grams 21.44 grams

FIG. 3-E.

Mills Field—363 Days
Pipe Control



Loss per square foot per year
0. grams 96 grams

FIG. 3-F.

apart and will not interfere with each other, but discharge in proportion to their potential above the surrounding soil. This potential is practically the same at all distances from a pipe having a fair amount of insulation.

Typical corrosion coupons removed from the lines of the Pacific Gas and Electric Co. are shown in Fig. 3, and are described in detail as follows:

(a) Napa River is a salt water inlet from the San Francisco Bay. These plates were installed at low tide in the mud at a crossing of three 8-inch pipes about five miles south of the City of Napa. The pipe coupon lost weight at the rate of 16 per cent a year, giving an estimated life to the lines of six years. This is confirmed by the fact that another crossing failed after six years of service and was abandoned. The control plate shows the corrosive effect of the salt marsh mud.

(b) These plates were removed from a 4-inch line at Tracy in the San Joaquin Valley. The soil at this location is adobe and the level land retains the water.

(c) These plates were installed in the Sonoma Valley near the Glen Ellen State Hospital. Soil is sandy clay.

(d) and (e) These plates were taken from the lines near Shellville and Sebastopol, respectively. Both of these localities are of a sandy clay formation. At these locations the pipes were positive at the time the initial soil current survey was made, but as the season advanced the polarity reversed, so that the pipes were cathodically protected. This is shown by the condition of the corrosion coupons, the pipe coupons having lost less weight than the control coupons which were attacked by the soil.

(f) These plates were taken from the 20-inch line south of San Francisco in the Mills Field reclaimed tide lands. Five miles of this line are cathodically protected as previously described. Plate No. A3 connected to the pipe lost no weight whereas the control plate No. A4 lost 96 grams due to soil corrosion alone.

These coupons were in all cases installed after a soil survey along the pipe line showed the existence of positive sections on the pipe. In the localities that are cathodically protected, the coupons are maintained to show the operating efficiency of the protective equipment.

The coupons (d) and (e) are of interest as they show that although the corrosivity of the soil as indicated by the control coupons was appreciable, there was little corrosion on the pipe. The pipe line is a continuous welded steel line traversing various formations and crossing over hills and through valleys. If the line had been protected in accordance with a soil corrosivity survey the pipe would have been over insulated.

(Continued on Page 43)

Pacific Coast Gas Association

Managing Director: Clifford Johnstone
Association Headquarters:
447 Sutter Street, San Francisco

President: H. L. Masser
Vice-President and Executive Engineer,
Los Angeles Gas and Electric Corp.

Convention Dates Set, Sept. 13-15

FOLLOWING a meeting of the Board of Directors held in Los Angeles on March 17, President H. L. Masser announced that the 40th Annual Convention of the Pacific Coast Gas Association will be held at the Ambassador Hotel, Los Angeles, on September 13, 14 and 15, 1933. The selection of this centrally located hotel will be popular with Association members as it will permit many to attend who are prevented by the well known depression from wandering far afield even for a gas convention.

The Ambassador is a city within a city. Located in Los Angeles' famous Wilshire District, a few minutes by bus or car from the center of the city, it is self contained. It has shops, restaurants catering to both fat and flat pocketbooks, meeting and committee rooms of all sizes, tennis courts, a swimming pool, a miniature golf course, and a motion picture theatre, all surrounded by a beautiful park.

D. L. Scott, Manager of Public Relations, Los Angeles Gas and Electric Corp., will be in charge of convention arrangements. While the budget restrictions under which Mr. Scott will have to work, will necessitate the elimination of many of the frills which have graced previous conventions, he assures us that nevertheless this one will be a good convention at which the business and research of the gas industry can be discussed in detail in comfort and without curtailment.

Assn. Committees Start Final Lap

With Spring conferences behind them and dates set for the Northwest Regional Conference and the Convention, the Association's section and committee chairmen are marshalling their forces for the drive which will result in completed reports and all that means in the way of the solution of pressing problems and helpful additions to the literature of the gas industry. The word has gone out that committee reports should be completed and in the hands of Section Chairmen by June 15. This year publication in the Convention issue of *Western Gas* (September number) will be selective. Only the most informative and complete reports will be published.

C. A. Swigart Joins Association Staff

C. A. SWIGART, who for the past year has acted as trade relations representative of the Pacific Coast gas and electric industries, working under the direct supervision of the Pacific Coast Electrical Bureau, will continue his work after April 1 under the banner of the Pacific Coast Gas Association. Mr. Swigart has contributed materially to the solution of the many controversial problems which arise between appliance manufacturers, dealers and utilities during the process of marketing appliances, and is well and favorably known to all branches of coast appliance merchandising activity. With the Association he will continue his studies in the merchandising field and in addition will work particularly with gas appliance manufacturers in an effort to reach a solution of their many competitive and marketing problems.

C. A. Swigart

Mr. Swigart's experience has equipped him to view the problems of the merchandiser with sympathy and understanding. He has himself been an appliance salesman. For a number of years his home has been in Medford, Ore., where he was comptroller of the California Oregon Power Co., and later the editor and publisher of the Medford Daily News. While in Medford he served as President of the Chamber of Commerce, the Rotary Club, and the School Board. Before going to Medford Mr. Swigart was identified with several companies manufacturing heavy machinery both in California and in the middle west.

Commercial Section Conference

THE Commercial Section's two-day conference, held March 16 and 17 at Los Angeles, brought a representative attendance from many points on the Coast, with a strong program as the attraction. All sessions were in the auditorium of the L. A. Gas and Electric Corp. building. F. U. Naylor presided over the conference as general chairman of the Commercial Section.

Two luncheon meetings, held on the same floor of the L. A. G. and E. building, added greatly to the conference program. The Thursday luncheon was sponsored by the Publicity and Advertising Section, Eugene P. Ramsay, chairman of that Section serving as master of ceremonies. Elliott C. Hensel, director of advertising for the Los Angeles Illustrated Daily News, gave a stimulating address on present trends in advertising and sales appeals as the highlight of this luncheon speaking program. Clyde H. Potter, commercial manager for the Southern Counties Gas Co. was in charge of the Friday luncheon program, which featured an informal address by Kate Brew Vaughn, home economics director of the Los Angeles Herald Express. Mrs. Vaughn's message on trends in home cookery was a frank statement of what convenience in modern kitchen equipment means to the woman of today.

Each of the two business programs was in charge of one of the Section's main committees—that on Thursday being arranged by the Industrial Sales Committee of which K. B. Anderson, Coast Industrial Gas Co., is chairman; and that of Friday being directed by the Domestic Sales Committee, H. E. Davidson, Southern California Gas Co., chairman. Present forms of competition in both industrial and domestic fields occupied much of the program. A discussion

on use of gas in agriculture, led by C. M. Grow of the Southern California Gas Co. on Thursday, brought a number of contributions on gas applications in dehydration, in the poultry industry, and in serving the gas engine load.

On the morning program Friday the Domestic Sales Committee arranged a symposium of manufacturers' views under the head of trends in domestic gas appliance marketing, and featuring gas ranges, heating equipment, water heaters, and refrigerators. The afternoon program dealt with the subjects of air conditioning, market survey, and a general discussion of competitive factors. F. U. Naylor, chairman of the Section, led the discussion on solid and liquid fuel competition.

Dues for New Members Reduced on April 1

Two dollars and a half will admit ambitious gas men to membership in the Pacific Coast Gas Association for the second half of the fiscal year which ends on September 30. It is a good time to join in the work being done by the Association in all fields affecting gas and gas appliances. The Association office will be glad to send application blanks upon request.

Year-End Figures Released for Coast

THE statistical statement published below, compiled in the office of the Pacific Coast Gas Association, compares gas company operations for the calendar years 1931 and 1932.

It is pointed out that the gain in domestic sales was occasioned by abnormally low temperatures during the first three months of 1932, for which period domestic sales were 26.0 per cent over 1931. For each remaining month of 1932 domestic sales have been less than the corresponding month in 1931, reflecting the effect of unemployment and economy in the home. On the other hand the very severe decline in commercial and industrial sales is not entirely due to reduced business activity, as a large part of it reflects improved water conditions in 1932 permitting the greater use of hydro-electric plants and the consumption of less fuel in steam electric generating plants.

The large increase in gas main mileage is due to the fact that one large company now computes its mileage on a 3-inch equivalent basis.

The figures include gas purchased and sold for use in steam electric generating plants but do not include gas used by oil companies for field and refinery use, and the gas sold does not include gas used by gas companies in their compressor plants.

GAS COMPANY OPERATIONS FOR STATES OF CALIFORNIA, ARIZONA, NEVADA, OREGON AND WASHINGTON AND PROVINCE OF BRITISH COLUMBIA

Calendar Year 1932 Compared with 1931

	1931	1932	Per cent Change
Production—M c.f.			
Water Gas	3,044,755	2,907,490	
Coal Gas	1,508,872	1,516,614	
Oil Gas	8,018,683	7,017,779	
Coke Oven Gas	640,584	670,870	
Butane Gas—550 Btu	157,274	252,531	
Natural Gas Purchased	163,156,872	135,086,528	
Total	176,527,040	147,451,812	—16.5%
Active Meters—Dec. 31			
Domestic	1,569,318	1,533,513	— 2.3%
Commercial and Industrial	68,552	69,897	+ 2.0%
Total	1,637,870	1,603,410	— 2.1%
Sales—M c.f.			
Domestic	58,693,423	62,834,836	+ 7.0%
Commercial and Industrial	90,027,134	61,818,596	—31.4%
Total	148,720,557	124,653,432	—16.1%
Gross Revenue			
Domestic	57,522,916	60,066,317	+ 4.4%
Commercial and Industrial	18,910,557	14,893,419	—21.2%
Total	76,433,473	74,959,736	— 1.9%
Miles of Main—Dec. 31	25,335	26,512	
Number of Employees—Dec. 31	11,544	11,432	

1933 Calendar

April

10th Annual A.G.A. Distribution Conference—Hotel William Penn, Pittsburgh, Pa., April 3, 4.

Mid-West Gas Association—Fort Des Moines Hotel, Des Moines, Iowa, April 10, 11, 12, 1933.

Bureau of Standards Corrosion Conference (Western) — Los Angeles, Calif., April 13, 14, 1933.

Southern California Meter Association—Los Angeles, Calif., April 27, 1933.

Missouri Association of Public Utilities—Hotel Jefferson, St. Louis, Mo., April 27-28, 1933.

May

Southern Gas Association—25th Annual Convention, Hotel Shoreham, Washington, D. C., May 2,3,4, 1933.

Commercial Section, American Gas Association—Southern Regional Gas Sales Conference, Hotel Shoreham, Washington, D. C., May 2,3,4, 1933

Natural Gasoline Association of America—Annual Convention, Tulsa, Okla., May 15, 16, 17, 1933.

American Petroleum Institute—Mid-Year Meeting, Tulsa, Okla., May 17, 18, 19, 1933.

June

Pacific Coast Gas Association—Northwest Conference, Olympic Hotel, Seattle, Wash., June 22-23, 1933.

September

Pacific Coast Gas Association—Annual Convention, Ambassador Hotel, Los Angeles, Calif., Sept. 13, 14 and 15, 1933.

Canadian Gas Association—Annual Convention, Ottawa, Can., Sept. 18, 19, 1933.

American Gas Association—15th Annual Convention, Chicago, Ill., week of Sept. 25, 1933.

Natural Gas Department, A.G.A.—Annual meeting, Chicago, Ill., September 25, 1933.

October

American Petroleum Institute—14th Annual Meeting, Chicago, Ill., Oct. 24-26, 1933.

Russell Granted Permit

B. L. Russell of Baird, Texas, has been granted a permit to construct a gas transmission line in McCulloch County, Texas, to take natural gas to several cities and towns in that county.

Hendee Heads Gas Division of Oklahoma Utilities Assn.

R. W. Hendee

R. W. HENDEE, president, Oklahoma Natural Gas Corp., Tulsa, Okla., was elected 1933 chairman of the Gas Division of the Oklahoma Utilities Association at its 15th Annual Convention held at Oklahoma City, March 7 and 8.

R. J. Benzel, president of the Southwestern Bell Telephone Co., was named president of the Association to succeed R. J. Daugherty, public relations director of the Empire Companies, Bartlesville; H. B. Cobban of Miami, general manager of the Northeast Oklahoma Railroad Co., was elected first vice-president. C. O. Dunten, president of the Oklahoma Power & Water Co., Sand Springs, was named second vice-president; W. R. Emerson, vice-president and treasurer of the Oklahoma Gas & Electric Co., was reelected treasurer, and E. F. McKay was retained as manager.

Frank Q. Cannon, Manager of Honolulu Gas Co., Ltd., Passes

Frank Q. Cannon, manager of the Honolulu Gas Co., Ltd., Honolulu, Hawaii, died March 5 at Queen's Hospital, Honolulu, following an emergency operation. Mr. Cannon was well known in the gas fraternity of the west having been connected with the industry for many years. He was a member of the Pacific Coast Gas Association and a frequent delegate at P.C.G.A. conventions.

Mr. Cannon was born on September 27, 1884, at Ogden, Utah. He was educated at the University of Utah, serving an apprenticeship in the electric department of the Utah Light and Power Co. while attending college. From 1908 until 1911 he was with the J. P. O'Neill Construction Co. as superintendent at Ogden, Utah. For the next four years he acted as commercial representative of the Denver Gas and Electric Light Co., Denver, Colo. In 1914 he was appointed sales manager of the Honolulu Gas Co., Ltd., being named manager in 1916 and occupying that post until the time of his death.

Ed. Watkins Transferred to New Braunfels for United

Ed Watkins, for some time manager for United Gas Public Service Co., LaGrange, Texas, has been transferred to New Braunfels, Texas, the appointment being effective March 1. Mr. Watkins has been succeeded at LaGrange, by Harold Beauchamp.

Franchise Up at Auction

Announcement is made of a public auction to be held on April 10, at Jackson, Texas, for the purpose of disposing of the gas franchise in that town, according to A. W. Brown, mayor of the town.

Southern Gas Assn. and Regional Sales Conference to Meet Jointly, May 2-4

THE Southern Gas Association will celebrate its Twenty-fifth Anniversary at its Washington meeting, May 2, 3, and 4, 1933, with the Shoreham Hotel being designated as headquarters. There has been arranged a program of outstanding interest to all in the gas utility business, according to S. L. Drumm, secretary-treasurer of the organization.

In addition to the regular program, there will be a reunion of all past presidents, and it is contemplated that approximately 15 will be in attendance. A reunion of the Charter Members, who organized the Southern Gas Association in 1908 in Atlanta, Ga., will also be held.

Following is the tentative program, as yet incomplete:

General Sessions

"Constructive Cooperation Within the Gas Industry," Floyd W. Parsons, Gas Age-Record, New York.

"Development, Research, and Advertising —The Manufacturers' Contributions to the Industry," John A. Fry, vice-president of the Detroit-Michigan Stove Co., Detroit, Mich.

"Public Utility Contribution to Economic Stability," Alexander Forward, managing director of the American Gas Association, New York.

"Public Relations,"' N. H. Gellert, president, National Public Utilities Corp., Philadelphia, Pa.

Address by John N. Shannahan, president, Midland United Co., Indianapolis, Ind.

Technical Section Meeting

"Mixed Gases," Thomas B. Hopper, Washington Gas Light Co., Washington, D. C.

"Relation of Meter Accuracy to the Net Earnings of a Company," A. M. Spencer, Columbus Gas Co., Columbus, Ga.

"Refractory Screen Oil Gas Process," Alfred Johnson, Combustion Utilities Corp., New York.

Southern Regional Conference

Meeting jointly with the Southern Gas Association, the Southern Regional Gas Sales Conference, sponsored by the Commercial Section of the American Gas Association, is holding its annual sessions, with the following program scheduled:

"Meeting Electric Competition in the Home," F. M. Milward Oliver, Philadelphia Gas Works Co., Philadelphia, Pa.

"Today's Water Heating Market and Methods of Capturing It," J. Albin Johnson, Ruud Water Heater Co., Pittsburgh, Pa.

"Air Conditioning Developments," V. S. Day, Carrier-Lyle Corp., Newark, N. J.

"Some Southern Gas Refrigeration Problems," W. A. Hudson, Birmingham Gas Co., Birmingham, Ala.

"Securing and Holding Central Plant Heating Customers," F. J. Evans, R. J. Evans Engineering Co., Birmingham, Ala.

"Boiler Efficiency and Conversion Factors," J. B. Milmoe, Alabama Natural Gas Corp., Birmingham, Ala.

"Developing the Sales Department Prospects," Walter Adams, Memphis Power and Light Co., Memphis, Tenn.

"Converting Bakeries to Gas Fuel," A. P. Woody, New Orleans Public Service Inc., New Orleans, La.

Plant Reconstruction to Cost $100,000

RECONSTRUCTION of gas manufacturing equipment at the Lake Union plant is planned by Seattle Gas Co., Seattle, Wash., and will involve an expenditure of approximately $100,000 during the next few months. Announcement of the project was made March 25 by James F. Pollard, vice-president and general manager, following the signing of the contract with Semet-Solvay Corp. of New York which will finance and construct the improvements.

Construction of shop work was started immediately on signing of contract and field activities will begin about May 1 and will be concluded within a two months' period.

The proposed changes will result in 100 per cent utilization of heavy oil in place of diesel oil now used as an enricher for the gas now being made from Washington coal. Heretofore, it has been possible to use heavy oil only to the extent of 50 per cent for this purpose. The gas sets when equipped with this new machinery will have automatic control of the master valve which gives exact timing of the cycle of operation. However, the automatic features of the change will have no effect upon the number of men employed in the manufacture of gas.

Bill Against Utility Selling Killed in Missouri House

The Maxey "Fair Merchandising" Bill, introduced in the Missouri Legislature recently, was defeated in the House of Representatives on March 22. The bill was designed to prevent the sale of gas and electric appliances by utilities in the state of Missouri. The action of the House will probably eliminate further consideration of a similar bill now pending in the Private Corporations Committee of the Senate. The Legislature was scheduled to adjourn about April 1.

Commercial and Industrial Installations

(Continued from Page 19)

conditions necessary for efficient combustion. Obviously, the important factor of this type of burner is the correct design of the venturi.

On the other hand, practice indicates that the multiple jet type, which depends more on natural draft for its required air, is more suitable for firing at lower gas pressures, and if firing at nominal rate the multiple jets of gas will mix with the air, and combustion will be complete in a comparatively small volume. However, on forcing the burner, this mixing must necessarily be done in the firebox, and hence requires more of the furnace volume for combustion, so that rather than force a multiple jet burner beyond its nominal rating it is advisable to oversize the burner to permit proper mixing. In either case the importance of flexibility should be considered, and in this perhaps the venturi type offers more because either burner orifice or pressure can be changed within the limits of the venturi design itself and relatively high burner efficiencies can be maintained.

It is of great assistance to the salesman if he will, while making the survey of the job, determine the maximum load that the boilers will be expected to carry, the maximum draft that can be obtained, and the furnace volume which is available. Knowing these things he will be in a better position to determine what type of burner is more particularly adaptable to a given installation. This will avoid the necessity of making any alterations after the installation has been completed.

The general practice for firing high pressure boilers such as the horizontal return tubular boilers, the water tube boilers and Scotch Marine boilers, has been to use the "straight-shot" burner. The various manufacturers of gas burning equipment have determined the most suitable manner for applying their burners, and such information is easily available.

Heating Boilers

Within the last two or three years the conversion of heating boilers has come in for particular attention because of their great number and the desirability of this load. In applying gas to these heating boilers (which include the cast iron sectional types and the steel firebox types) it has been found that a simulation of the coal grates as obtained by upshot burners is very desirable. We again have a multiple jet and venturi type upshot burner, as well as a raw gas type. Without considering the burners as types, it is preferable to study the boiler types and determine what the requisites of application should be to achieve the highest combustion efficiencies.

(1) There are the water legs, particularly the base wherein the greatest differential exists. Obviously, a greater concentration of heat at this point is desirable. The old coal fire afforded this by radiation, and heat transmission by radiation is proportional to the difference of the fourth powers of the absolute temperatures. Hence, a gas burner affording radiant heat will be more efficient than one without. The lack of luminosity of the gas flame itself makes it important to provide radiant heat by refractory. Such direction of heat to the base of the water legs then should permit a scrubbing action on the legs and crown, or active heating surface, thereby increasing heat absorption by convection. The advantage of this is that maximum use is made of the primary heating surfaces.

Leaving the burners and application to more special and technical treatment, consider the very important factor of fuel and air controls on commercial and industrial boilers. This subject has been reported by J. F. Aicher in his paper on Automatic Control, *Western Gas,* December, 1932, so these remarks will be confined to the three types—throttling, step, and off and on. It is to be pointed out in this connection that I am confining this discussion of controls to boilers of 50 h.p. or over.

(1) *Throttling.* This type of control is generally a steam actuated diaphragm valve, of which there are several on the market. Their function is primarily to control the firing of the boiler, and their operation is familiar to almost everyone. The point involved is the synchronizing of an operating mechanism for control of air through the burners and to operate the dampers. There are types in which this operating mechanism is integral with the operation of the regulator by means of a special yoke arrangement so that as the valve functions the dampers and louvres are closed or opened to predetermined positions for maximum efficiencies. Table No. 2 shows test results made on an installation of two 60-h.p. boilers in a dairy. It indicates the average results that may be expected with this type of control.

TABLE NO. 2

Load	Maximum	Aver.	Min.
Steam Pressure, lbs.	90	90	90
CO_2	9.5	10.5	10.5
O_2	5.5	3.5	6.5
CO	0.0	0.0	0.0
Excess Air	58	33	76
Stack °F.	550	550	510
Stack Draft	.05	.04	.03
Gas cu. ft. per hr.	4706	3049	2644
Combustion Efficiency	79.1	80.8	78.9

A modification of this type of equipment is the simple diaphragm control which is actuated by gas supply, as it is varied by means of a fuel regulator ahead of it. The resultant action is the same in both cases. This type is preferable on boilers whose load is above 50 per cent rating.

(2) *Step Control.* Exemplary of this type is the Merritt system, and because of its general use it is fairly well understood. Such a system is highly satisfactory because the most efficient adjustments can be made, set and locked for each step, so that independently of operators it remains constant. Table No. 3 shows test results on an installation of a 250 h.p. water tube boiler operated by the Merritt system.

TABLE NO. 3

Load	Maximum	Aver.	Min.
Burner Pressure	1 lb. 6 oz.	12 oz.	2½ oz.
Steam Pressure	145	145	145
CO_2	10.9	10.6	9.7
O_2	2.1	2.6	4.1
CO	0.0	0.0	0.0
Excess Air	10.0	13.0	22.0
Stack °F	525	475	395
Gas cu. ft. per hr.	10,050	7370	3470
Combustion Efficiency	80.4	81.3	82.4

This type of control is adaptable to almost any installation. However, there is the consideration that on highly fluctuating loads there is considerable jumping from one step to another.

(3) *Off and On Control.* This type of control is well adapted to use on larger heating boilers which are usually unattended for long periods, and also on smaller industrial boilers. Such controls are usually gas operated diaphragm valves actuated through a combination pressure control and low water cutout. Since the fuel is burning at a constant rate whenever the load calls for steam the damper can remain in fixed position, and the air need only be controlled by a louvre operated by a diaphragm, which will close tightly when the fire is out. With short firing periods and longer cutout periods the advantages are obvious. The adjustments being made, the combustion efficiency is fixed. Table No. 4 shows analysis made under operating conditions on two 70-h.p. Kewanee horizontal return tubular boilers controlled by Powers dual control.

TABLE NO. 4

Load	Maximum No. 1	Maximum No. 2
Burner Pressure	1.0	1.0
Steam Pressure	8	8
CO_2	11.3	11.0
O_2	.7	1.5
CO	0.0	0.0
Excess Air	4.0	7.0
Stack °F.	380	380
Stack Draft	.06	.065
Gas cu. ft. per hr.	3611	3620
Combustion Efficiency	84.4	84.3

Similarly, such a gas operated diaphragm can be operated by temperature controller, and Table No. 5 shows results obtained on two boilers supplying a cucumber nursery. (No. 1 boiler, Erie City type; No. 2 boiler, Pacific type. Both individually controlled by a P-110 Powers temperature control.)

TABLE NO. 5

Load	Maximum Boiler No. 1	Maximum Boiler No. 2
Burner Pressure	1.0	1.0
Water Temperature	200 degrees	200 degrees
CO_2	11.5	10.8
O_2	1.5	4.2
CO	0.0	0.0
Excess Air	8.0	25.0
Stack °F.	410	400
Gas, cu. ft. per hr.	916	916
Stack Draft	.03	.01
Combustion Efficiency	83.6	83.3

As a matter of interest, the thermostat is inserted on the boiler take-off and set to 200

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20 articles, published during January and February, attest the importance and value of our Technical News Service, supplementing the cooperative advertising program. Here they are:

TITLE OF ARTICLE	PUBLICATION
The House of Professor S. H. Graf, Corvallis, Ore.—Gas heating and cooking throughout	*Architect and Engineer*
Cooperative Sales—1933 gas appliance market for cooperative activities	*Western Plumbing and Heating Journal*
A Modern Gas Fired Steam Installation—Gas heating in new S. F. War Memorial	*Western Plumbing and Heating Journal*
More Efficiency and Less Cost with Automatic Control—for all types of gas-fired equipment	*Pacific Factory*
Hotels Cook, Bake, Heat with Gas—Conversion of all types of baking appliances	*Western Hotel Reporter*
Jerkie one of Latest Table Delicacies—Development of gas ovens for use in preparing Alaska Reindeer Jerkie	*Pacific Coast Record*
Conversion to gas at Stanford University kitchen	*Western Restaurant*
"Gus' Fashion" Turns to Modern Fuel—One of San Francisco's old and renowned dining houses converts to gas	*Western Restaurant*
Conversion to Gas Cuts Costs—Gas in American Dairy, San Jose	*Pacific Dairy Review*
Report Indicates Popularity of Gas—General convenience of gas for cooking	*Hotel News of the West*
Operate Modern Plant—Gas-fired boiler at Consolidated Laundry, San Jose	*Pacific Laundry Journal*

TITLE OF ARTICLE	PUBLICATION
Things to Think of Concerning Gas—Gas fuel in cannery boilers	*Western Canner & Packer*
New Fruit Confections Called 'Health Foods'—Gas fuel in Infanta Pomona Co., L. A.	*Western Confectioner*
Economical Operation of Gas-fired Steam Boilers—Automatic damper control for steam boiler plants of all types	*Pacific Factory* *Western Furniture*
Stabilization Seen for Gas Range Sales	*Retailing*
Side Lights of the Industrial Problem—New uses for industrial gases with development of new equipment	*Western Machinery & Steel World*
New Gas-Fired Galvanizing Plant—Description of galvanizing tank and steam boiler installation at Theem Mfg. Co., Emeryville, Calif.	*Western Machinery & Steel World*
Gas Cooking Equipment is Important Feature of the Chicago Exposition—Gas equipment on display at National Food, Cookery and Allied Trades Exposition	*Pacific Coast Chef*
Herbert's, Los Angeles, to Have Tenth Birthday—Gas cooking equipment in popular L. A. restaurant	*Western Restaurant*
Modern Kitchen Ranges at Training Station—Gas cooking at U. S. Naval training Station, San Diego—Also, automatic damper control on heating plant at Beverly Hills hotel	*Hotel News of the West*

APRIL SCHEDULE OF ADVERTISEMENTS

APPLIANCE DEALERS
Western Plumbing & Heating Journal
Western Appliance Retailing

ARCHITECTS, BUILDERS
Architect & Engineer
California Arts & Architecture
Pacific Builder & Engineer
Southwest Builder & Contractor

HOTELS, RESTAURANTS, CATERERS
Pacific Coast Record
Pacific Northwest Caterer & Steward
Western Restaurant

MISCELLANEOUS
Western Baker
Western Confectioner
Pacific Laundry Journal & Dry Cleaner
Western Machinery & Steel
Pacific Factory
Pacific Dairy Review

FACTORY—A Los Angeles brick plant, completely gas-equipped, is the medium for this sales-message in "Pacific Factory."

STEEL — This ad features Pacific H.B.A. Steel Company, with a powerful testimonial by the head of the concern.

BAKERY—In Western Baker appears this impressive message on gas-fired equipment of the San Joaquin Baking Company.

LAUNDRY—Pacific Laundry Journal carries this convincing statement by the head of a successful San Francisco laundry.

WATCH THIS PAGE EACH MONTH FOR MORE NEWS AND VIEWS

degrees F. to maintain 160-180 degrees in the greenhouses. It is interesting, too, that boiler No. 1 in Table No. 5 is an Erie City Economic type fired by straight-shot burners, and Boiler No. 2 is a Pacific boiler fired by upshot burners.

It may be seen from the tables that each of these controls will produce good results. It is chiefly a study of load characteristics which will determine the best type to install.

In this discussion I have not paid particular attention to the technical phases of furnace volumes, drafts, etc., for each of these topics is worthy of individual investigation.

W. E. Derwent
President

R. L. Klar
1st Vice-Pres.

R. B. Searing
Secretary

Mid-West Gas Assn. in Annual Conclave

PROGRAM details for the annual convention of the Mid-West Gas Association to be held April 10-12 at Des Moines, Iowa, are being worked out by the executive committee of the Association, made up of W. E. Derwent, Geo. D. Roper Corp., president; R. L. Klar, Des Moines Gas Co., Des Moines, Iowa, first vice-president, C. T. Williams, Sioux City Gas and Electric Co., Sioux City, Iowa, second vice-president and R. B. Searing, Sioux City Gas and Electric Co., secretary. The Association draws its membership from the states of Iowa, Nebraska, Minnesota, North and South Dakota.

Sessions will convene at the Hotel Fort Des Moines, at 10 A.M. on April 10 and will extend over a period of three days, ending with the afternoon meeting on April 12.

Among features on the tentative program released late in March by Mr. Searing are the following papers and reports:

"The Need of Tax Reduction," by the Honorable Clyde L. Herring, Governor of Iowa.

"Development of Gas Company Employees," by Ira Steele, assistant general manager, Des Moines Gas Co., Des Moines, Iowa.

"Load Building through Merchandising." E. J. Boyer, sales manager, Minneapolis Gas Light Co., Minneapolis, Minn.

"Holding the House Heating Load through the Use of Gas Designed Furnaces," Edwin A. Jones, L. J. Mueller Furnace Co., Milwaukee, Wis.

"Gas Mixing," R. M. Conner, director, A. G. A. Testing Laboratory, Cleveland, Ohio.

"Gas Range Sales through Utilities from the Manufacturer's Viewpoint." Thos. E. Bullion, Detroit-Michigan Stove Co., Detroit, Mich.

"Load Building through Water Heating," Frank Goode, Des Moines Gas Co., Des Moines, Iowa.

"Holding the House Heating Load through the Use of Conversion Burners," Walter H. Hoagland, The Sonner Burner Co., Winfield, Kan

"Remarks by the President," W. E. Derwent, Geo. D. Roper Corp., Rockford, Ill.

"Recapitulation of papers presented at the Twelfth Meter School and Conference," John M. Drabelle, Iowa Electric Light & Power Co., Cedar Rapids, Iowa.

Reports from American Gas Association representatives will be given as follows:

Manufacturers': Robert J. Canniff, Standard Gas Equipment Corp., Chicago, Ill.

Accounting: A. W. Schmitt, Des Moines Gas Co., Des Moines, Iowa.

Technical: P. A. Stover, Central States Electric Co., Cedar Rapids, Iowa.

Advertising: C. A. Nash, United Light & Power Engineering and Construction Co., Davenport, Iowa.

Commercial: J. T. Schilling, Des Moines Gas Co., Des Moines, Iowa.

Industrial: Robert H. Luscombe, Des Moines Gas Co., Des Moines, Iowa.

10th Annual Distribution Conference

AS *Western Gas* goes to press, the Distribution Committee of the American Gas Association is calling its 10th Annual Distribution Conference at the William Penn Hotel, Pittsburgh, Pa., April 3 and 4.

Sessions are convening at 10 A.M. on April 3, with a short general meeting followed by a symposium on pipe corrosion. Scheduled to take part in the preliminary meeting are C. A. Harrison, chairman of the Distribution Committee, opening the conference; Alexander Forward, managing director of the A. G. A., extending the greetings of the Association, and Frank R. Phillips, president of the Philadelphia Co., welcoming the delegates to Pittsburgh.

The symposium features the following:

Report of Committee on Pipe Coatings and Corrosion, Geo. H. Boyd, Consolidated Gas Co., chairman.

"The Progressive Deteriorating of Pipe Coating," Dr. Scott Ewing, research associate, U. S. Bureau of Standards, Washington, D. C.

"A Method of Determining Condition of a Pipe Coating," Dr. Gordon Scott, A. P. I. Research Associate, U. S. Bureau of Standards, Washington, D. C.

Abstracts of Committee Report and Dr. Ewing's Tests. J. K. Crowell, S. R. Dresser Manufacturing Co., Bradford, Pa.

The afternoon session convening at 2 P.M. schedules several interesting papers and reports: "Corrosion Mitigation on Gas Line of the Pacific Gas and Electric Co.", a paper by W. R. Schneider, Pacific Gas and Electric Co., San Francisco, Calif.; "Pittsburgh Utilities Underground Survey," a paper by Dr. J. B. Garner, Mellon Institute, Pittsburgh, Pa.; and two committee reports: Unaccounted-for Gas Committee, J. M. Pickford, Northern Indiana Public Service Co., Hammond, Ind., chairman, and a report of the Meters Committee, C. H. Stevick, Consolidated Gas Co. of New York, chairman.

Tuesday, April 4, delegates are meeting to hear a paper on "The Distribution System and the Gum Problem," by J. A. Perry, The United Gas Improvement Co., Philadelphia, Pa., and four reports: C. C. Simpson, Consolidated Gas Co. of New York, as chairman, reporting for the Cast Iron Pipe Standards Committee; Erick Larson, Long Island Lighting Co., Bay Shore, Long Island, chairman, reporting for the Committee on Pipe Joints; K. R. Knapp, A. G. A. Testing Laboratory, Cleveland, Ohio, reporting on Research on Mechanical Pipe Joints;" and Erick Larson reporting on Weld Test Meters.

Tuesday afternoon session features two papers, "Gas Conditioning," by L. W. Tuttle, Public Service Co. of Northern Illinois, Chicago and "Distribution of Gas Through the Medium of High Pressure Plant," by T. H. Kerr, Columbia Engineering & Management Corp., Columbus, Ohio.

To Begin Extension to 16 Iowa Cities and Towns May 1

Construction is scheduled to start on May 1 on 6 miles of line for the Natural Gas Pipe Line Co. of America, this work representing the initial construction activity on the company's proposed extension to Waterloo from the Texas-Chicago 24-inch main line. According to press reports from the district, Leland Duddleston, engineer in the state of Iowa for the company is in direct charge of the project.

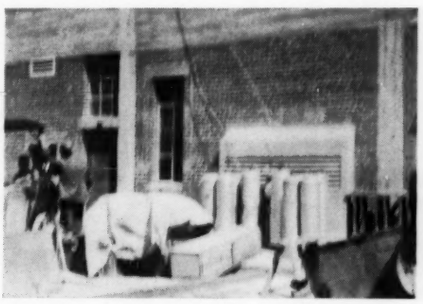
Granting of the company's application for permission to serve natural gas to nearly a score of Iowa cities and towns on March 16 cleared the way for construction work to be definitely scheduled.

Towns named in the permit are Fairfield, Malvern, Clarinda, Osceola, Chariton, Ottumwa, Wapello, Burlington, Oskaloosa, Sigourney, Keota, Washington, Iowa City, Cedar Rapids, Keokuk and Fort Madison. A few of the towns will receive gas for the first time, but many are now being served with manufactured gas and will be changed over on arrival of the new service. Among these latter are Cedar Rapids, Burlington, Ottumwa, Iowa City and Fort Madison.

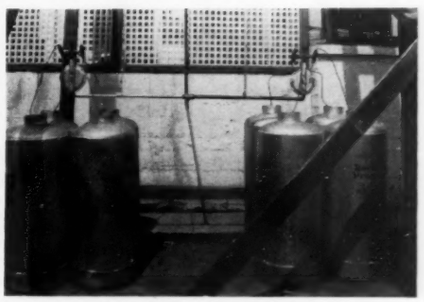
BUTANE - PROPANE NEWS

Covering Liquefied Petroleum Gas Service

Bottled Gas in the Earthquake Area

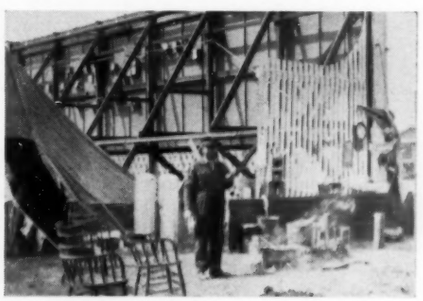


Flamo was connected to linotypes and lead pots at the Long Beach Press-Telegram, through 200 feet of copper tubing run from the ground to the third floor of the building.



Rockgas set-up at Mission Cafeteria, Ocean Ave. at American, Long Beach. This cafeteria operated all appliances with bottled gas and consumed 800 pounds of the product daily.

Shellane installation at the Seaside Hospital, Long Beach—one of many served with bottled gas during period while gas mains were under repair. Note the timbers supporting weakened walls.



Emergency fire station at Long Beach (former building of this station was demolished). Until Standard Flamo arrived, cooking for the firemen was done at the open fire shown in foreground.

BOTTLED gas companies in Southern California deserve high praise for rising promptly to the emergency created in Southern California by the March 10 earthquake. With the Long Beach gas system entirely shut off, a dependable fuel was urgently needed at many critical points in the city. Imperial Gas Co. with "Rockgas," Standard Oil Co. with "Flamo," and Shell Oil Co. with "Shellane" were on the job shortly following the quake, and worked closely with the Long Beach Gas Department and relief agencies throughout the week or more before gas began to come back on the Long Beach system. Petrolane Co. also contributed several sets, though not actively engaging in installation work.

Imperial Gas Co.'s plant is located in Long Beach city limits, and A. N. Kerr, president of the company, was on the ground early Saturday morning. After determining the need Mr. Kerr put the Rockgas staff in motion, and also telephoned A. E. Balsley, vice-president of the Standard Oil Co. at San Francisco, who cleared the way for concentrating the Flamo sales organization in the Long Beach area. G. H. Helmick, division superintendent on Flamo sales, and L. F. Gore, head Flamo salesman in the Los Angeles district, were actively in charge of Standard's bottled gas operations.

All of the bottled gas companies went ahead with no thought of profits. Fuel and installations were given gratis to hospitals, fire stations and similar public service centers. Equipment was loaned to commercial establishments such as restaurants and hotels, and fuel was sold at usual rates with installation charges held to a bare minimum to cover actual costs. Telephones in the local offices of the several companies rang constantly for the first three days, and not one in three installations which could have been made was set.

In all, there were some 100 to 150 outfits put in, of which Rockgas installed about 50 and Standard Flamo about 70. Agents of the various companies from all over Southern California were called in to assist in the emergency schedule, and worked 16 to 18 hours daily.

Most of the sets were large multiple units, in service to hospitals, fire stations, maternity homes, large restaurants, hotels, bakeries, etc. Service to hospitals was of first importance, particularly for the sterilizers. Until bottled gas was available, instruments were being sent to Los Angeles, 20 miles distant, to be sterilized.

On Monday, March 14, the Long Beach fire chief appointed a man in charge of bottled gas installation inspection. The companies also inspected all outfits each day, and there were no accidents at all due to bottled gas. Several gasoline stoves and other portable equipment caused fires. The no-accident bottled gas record was due to careful installation, all containers used being to I.C.C. specifications and rigidly connected with copper tubing. All tanks were outside of buildings, being set in streets, on sidewalks, in alleys, etc.

Many natural gas appliances were used without adjustment, satisfactory operation being secured by keeping flames low. In a number of cases house lines which were shown to be pressure-tight through tests conducted by plumbers were used in bottled gas service, though most installations were direct-connected to appliances by ½-inch or ⅜-inch copper tubing.

The first installation was made Saturday morning at an armory, on an army requisition, Rockgas being connected to ordinary stoves for feeding refugees. Two 20-inch by 48-inch barrel-sized containers were set. Another Rockgas installation of interest was that at Sunshine Bakery where 6,000 loaves of bread were baked each night for the better part of a week. Here the oven burners were changed over, orifices being cut down. Among the larger commercial cooking installations of Rockgas was the Mission Cafeteria on Ocean Avenue, where eight tanks each of 210-pound capacity were manifolded. Some restaurants used from one to two of these 210-pound tanks daily.

The gas department suggested installation of bottled gas at a number of restaurants in outlying districts in order to keep people out of the business section. In all, nearly 50 restaurants were served, and those which were connected first did a land office business at the expense of their competitors. One portable kitchen from the Paramount studios, which usually operates on location, on bottled gas, was called into the quake area.

Among the Shellane installations was that at the Community Hospital, where a water heater with 1,500-gallon tank was connected.

CYLINDERS
FOR
BOTTLED GAS

Properly Designed in Accordance with I.C.C. Regulations — Rigidly Inspected — Thoroughly Tested.

The majority of distributors of Liquefied Petroleum Gas now use Scaife Cylinders.

Modern Manufacturing Methods combined with an increasing demand have resulted in Scaife I.C.C. Cylinders being the most economical cylinder in use today.

Cylinders built to meet each purchaser's service requirements.

A large stock of cylinders of standard sizes insures prompt service. 130 years of experience in manufacture of steel products is behind each Scaife cylinder.

FOUNDED 1802

WM. B. SCAIFE & SONS CO.

Oakmont, Pa. (Pittsburgh District)

New York Pittsburgh Chicago

GROBLE REGULATORS & GOVERNORS

Complete Line of Regulators for

Natural, Manufactured, Butane and Propane Gas

Pacific Coast Representative,

T. G. ARROWSMITH COMPANY,

661 Howard Street San Francisco, Calif.

Phone Garfield 8419

GROBLE GAS REGULATOR COMPANY

Office and Factory: Anderson, Indiana

Standard Oil also ran one mile of natural gas pipe line to serve the Community Hospital.

Flamo was provided for 11 fire departments. Another unique Flamo installation was at the Long Beach Press-Telegram plant, where linotype machines and lead pots were put back on service. The paper was printed for a few days in Pasadena, but came back to its own plant when 200 feet of half-inch copper tubing brought Flamo to the equipment on the third floor of the building.

Flamo production was continued at the Huntington Beach plant until this was shut down, and at this time 200 cylinders were trucked in from Kettleman Hills, 200 miles distant. Flamo was served in 91-pound cylinders, from two to 12 being manifolded; 600 of these tanks were on reserve at Standard's Long Beach plant.

Some bottled gas service was rendered outside of the Long Beach district, the Standard Oil Co. making an installation for the Compton News and for an emergency kitchen serving a bread line in Bellflower.

New I.C.C. Regulation on 406 (f) Drums

By a recent decision of the Interstate Commerce Commission a change in I.C.C. regulations has been approved effective April 1, 1933, authorizing use of 406 (f) drums made under specification 5F for liquefied petroleum gas with gas pressure not over 28 pounds per square inch at 70 degrees F. nor over 86 pounds per square inch at 130 degrees F. Specification 5 drums must not be used for shipments with such pressures but may be used when the gas pressure is not over 23 pounds per square inch at 70 degrees F. nor over 70 pounds per square inch at 130 degrees F.

Hind in Charge of Shellane Sales In Southwestern Territory

A. E. Hind is assuming charge of Shellane sales for Southern California, Arizona, and parts of New Mexico and Nevada, working out of Shell Oil Co.'s Los Angeles offices. This work has been previously handled by R. S. Barrows, under the direction of H. A. Rite. Mr. Barrows is now handling lubricating oil sales out of the Los Angeles office for Shell.

J. S. Bock Heads City Gas and Electric Corp. at Three Rivers

Announcement is made of the appointment of J. S. Bock, as vice-president of the City Gas & Electric Corp., Ltd., of Montreal, Can. The company owns and operates a plant for butane service in Three Rivers, Quebec, being Canada's first central plant, constructed in 1932.

Boyd Manager at McLean

Announcement has been made of the appointment of W. W. Boyd as manager of the McLean Gas Co., succeeding A. J. Tillery, who passed away recently.

17 Per Cent Gain in 1933 Sales

By E. B. SWANSON

Chief Economist,
Petroleum Economics Division,
United States Bureau of Mines

WITH an increase of approximately 5,000,000 gallons, representing a gain of 17 per cent over 1931 sales, the marketed production of liquefied petroleum gases during 1932 continued the increase which has been recorded annually during the past several years. The 1932 increase, however, did not equal that recorded for 1931, when marketed production of these gases was nearly 11,000,000 gallons larger than in the preceding year.

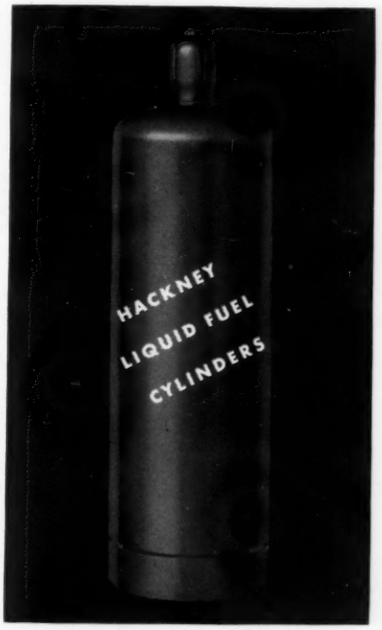
Table No. 1

Marketed Production of Liquefied Petroleum Gases, 1927-1932

Year	*Gallons*
1927	1,091,005
1928	4,522,899
1929	9,930,964
1930	18,017,347
1931	28,769,576
1932	33,630,236

The gases included are propane, butane, pentane and propane-butane mixtures. The gain recorded for 1932 was principally within the fields served by butane, especially for gas manufacturing purposes. The demand for propane was only slightly larger than in the preceding year. The distribution of 842,126 gallons of pentane is included in the quantities reported under pentane and propane-butane mixtures. Nearly all the liquefied petroleum gases marketed during 1932 were produced at natural gasoline plants. Some companies, however, reported production at refineries.

At the end of 1932, according to data furnished by the American Gas Association, liquefied petroleum gas was being delivered through mains to consumers in 134 communities in 28 States by 55 companies. Butane-air gas with heating value ranging from 560 to 600 B.t.u. per cubic foot was supplied to 91 communities in 26 States by 48 companies. A mixture of undiluted butane and propane gas with a heating value of 2,800 to 3,000 B.t.u. per cubic foot was supplied to 12 communities in California and Nevada by five companies. Undiluted propane gas with a heating value of 2,550 B.t.u. per cubic foot was supplied to 31 communities in Minnesota and North Dakota by two companies. These latter two companies do not distribute gas through mains from a central plant but use an "alley tank" system, delivering to a number of consumers on the same block or in the same locality from a central reservoir. The number of communities served at the close of 1932 represents a net gain of 16 over



THERE ARE TWICE AS MANY HACKNEY LIQUEFIED GAS CYLINDERS IN SERVICE AS ALL OTHERS COMBINED

● Hackney has had long and wide experience in the manufacture of cylinders—has designed and built them for more than 25 years, and cylinders for Butane, Propane, and Propane-Butane mixtures since their development.

Acceptance is evidenced by the long list of Hackney customers, including—Standard Oil of California, Shell Petroleum, Skelly Oil, Union Oil, Pennsylvania Salt, Mathieson Alkali, Hope Construction & Refining Company, etc.

Hackney engineers offer their services to all users of liquid fuel cylinders.

Shipment of standard sizes made from stock.

PRESSED STEEL TANK COMPANY

208 S. LA SALLE ST. BLDG., ROOM 1185, CHICAGO, ILL.
1363 VANDERBILT CONCOURSE BLDG., NEW YORK, N. Y.
6633 GREENFIELD AVENUE, MILWAUKEE, WISCONSIN
666 ROOSEVELT BUILDING, LOS ANGELES, CALIFORNIA

Hackney
MILWAUKEE

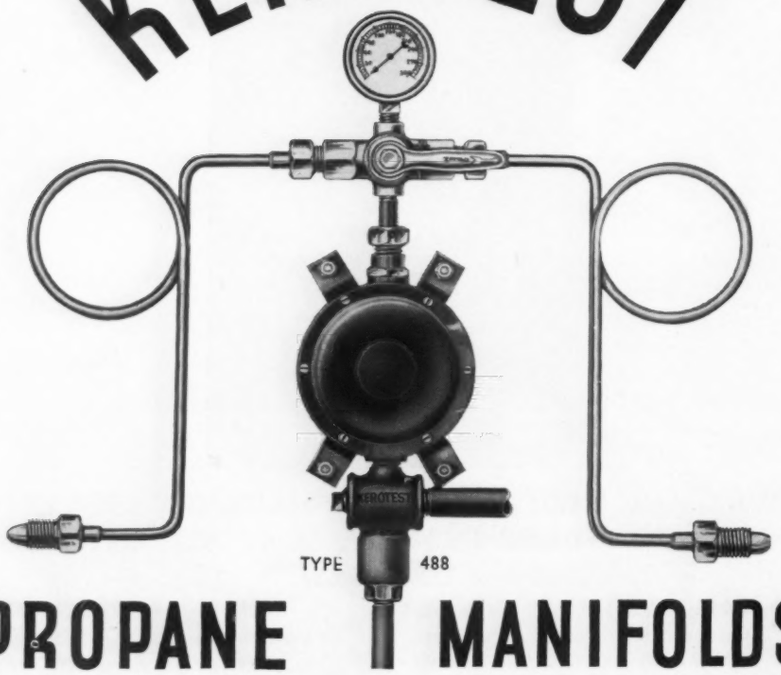
CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

Table II—Segregation By Uses of Marketed Production, Liquefied Petroleum Gases

(Figures in gallons)

Uses	Propane	Butane	Pentane and Propane-Butane Mixtures	Totals 1932	Per Cent 1932	Totals 1931	Per Cent 1931
Domestic	14,570,392	81,981	1,119,199	15,771,572	46.9	15,294,648	53.2
Gas Manufacturing	257,407	7,225,851	2,208,212	9,691,470	28.8	6,303,242	21.9
Industrial and Miscellaneous	354,072	7,353,856	459,266	8,167,194	24.3	7,171,686	24.9
Total	15,181,871	14,661,688	3,786,677	33,630,236	100.0	28,769,576	100.0
Shipped in—							
Cylinders or Drums	13,416,567	2,951	960,451	14,379,969	42.8	14,006,180	48.7
Tank Cars, Tank Wagons or by pipeline	1,765,304	14,658,737	2,826,226	19,250,267	57.2	14,763,396	51.3
Total	15,181,871	14,661,688	3,786,677	33,630,326	100.0	28,769,576	100.0

KEROTEST



TYPE 488

PROPANE MANIFOLDS

DIAPHRAGM PACKLESS

Forged brass construction of valve body and bonnets assure 100% safety and control at any pressure . . . specially formed triple metal diaphragm insures proper flexing in all positions . . . convenient location of lever handle gives fingertip control of Bottled Propane Gas . . . a most efficient unit designed especially for propane service.

Write for Circular W describing this and other Kerotest Forged Brass Products for Propane Gas Service.

KEROTEST MFG. CO.

PITTSBURGH, PENNA.

KEROTEST

Eliminate COLD 70°

The Low Limit Control System enables your gas burner to deliver full performance by keeping enough heat in radiators and hot air registers to prevent air stratification or "Cold 70°". A low priced control with a ready market. Minneapolis-Honeywell Regulator Company, 401 East 28th Street, Minneapolis, Minn. Branch offices or distributors in all principal cities

MINNEAPOLIS-HONEYWELL
Control Systems

the 118 communities reported at the close of the preceding year.

At the end of 1932, three communities in Canada were also supplied with butane-air gas. One community, Three Rivers, Quebec, was supplied from a plant located in that city while Milltown and St. Stephen, New Brunswick, were being supplied from Calais, Maine. It is reported that the manufacture of liquefied petroleum gases for domestic and industrial uses was begun at the Argentine Government refinery at La Plata on December 10, 1932.

Shipments of liquefied petroleum gases by tank car, truck, or pipe line, increased during 1932 by an amount which was nearly identical with the gain in total sales, while shipments in cylinders and drums showed only a small advance. This resulted from the fact that the demand for domestic purposes, met by cylinder and drum shipments, showed only a small gain, while the demand served by bulk shipments accounted for nearly all the recorded increase.

The 1932 production was reported by 20 companies, five operating in California and 15 east of Calif. Distribution by California companies totaled 6,173,456 gallons.

Gain in Net Earnings Reported for United Gas Co. Subsidiaries

Four subsidiary gas companies of the United Gas System, Houston, Texas, showed net earnings amounting to $4,249,619.64 for 1932, according to a statement released during the first of March by S. L. Davis, comptroller of the United System. Following is a report of the operating income and expenses for the four companies for 1932, together with the net profit.

	Operating Expenses	*Gross Income*
United Gas Public Service Co.	$11,658,141.50	$16,486,233.52
Texas Border Gas Co.	224,256.96	196,127.69
Southern Gas Utilities Co.	455,635.97	406,245.34
Houston Gulf Gas Co.	3,580,258.18	3,979,305.70
Total	$15,918,292.61	$20,167,912.25
Net Profit after Interest		4,249,619.64

Natural Gas Association Is Formed in State of Michigan

An association has been formed under the name of Natural Gas Association of Michigan for the promotion, protection and development of natural gas in that state. W. H. Caple of Clare, Mich., is named as president, Walter W. Russell, Mt. Pleasant, vice-president, and C. C. Harris, secretary. Approximately 200 central Michigan business men were present at the organization meeting.

Dilworth to Be Served by Detroit Lakes Gas Co.

Franchise granting the Municipalities Gas Corp. permission to install propane gas distribution equipment in Dilworth, Minn., was granted recently. The town will be served out of Detroit Lakes central storage plant by the Detroit Lakes Gas Co., a subsidiary of Municipalities Gas Corp.

Section of 2-inch service main removed by Southern California Gas Co. from Olive St. east of Willowbrook Ave. in Compton, Calif., on March 15.

Gas Service After an Earthquake

(Continued from Page 18)

George, superintendent of transmission. Lines were patrolled twice a day for several days following the shock.

In several cases broken gas mains paralleling broken water mains introduced water into the gas system which had to be blown free.

There were 628 meter locations, principally in the Compton and Southgate section, where buildings were demolished and restoration of service will be indefinitely delayed pending rebuilding. About 300 meters were damaged in the various districts, and another 200 meters, housed at the distribution building on Santa Fe Ave., Los Angeles, were also injured, some of them being thrown from the third floor to the ground. Broken services found up to March 28 numbered 350 and broken house lines 150, with additional damage still coming to light. The company's office building at Compton was demolished, temporary quarters across the street being occupied at once. At Downey the office was also damaged, while the Bellflower building will probably have to be razed. Downey, Artesia and Norwalk were not cut-off, Artesia being kept on service by turning off meters in the worst damaged sections of town.

All hospitals throughout the company's service territory were at once supplied butane-propane in tanks and men were stationed on continuous duty at each hospital to supply refills and see that satisfactory service continued. Bottled gas was also installed for several other users, among them the "Compton News-Tribune." The gas company, by means of bottled gas, had service to metal pots going three hours before electricity was back in the plant, and the newspaper commented upon this circumstance editorially.

After meter turn-ons started they continued on a 24-hour schedule. Where residents were not at home, turn-on men left cards requesting that they call the local offices, and also tagged the meter with a warning not to turn it on until the gas company employee arrived. In spite of these warnings many turned on their own meters. It was finally necessary to use radio appeals asking people to remain at home until the gas man arrived to turn on the meter.

All communities were reconnected by Thursday, March 16, and most of them had service much earlier than this date.

Some main extensions to give temporary service were made, among them a line to an emergency shopping district set up in the former quarters of the Oil Engineering and Equipment Exposition in the outskirts of Compton.

L. A. G. and E. Program

Los Angeles Gas and Electric Corp.'s southeastern territory, from Central Ave. east and from Slauson Ave. south, including Huntington Park, Walnut Park, Watts, Bell, Maywood, Cudahy, Florence and Willowbrook, was in the zone of intense disturbance. However, damage to the gas system was minimum, only 179 broken services being found. It was not necessary to shut off service.

W. M. Henderson, superintendent of distribution for the company, put a force of about 70 men to work, opening the Huntington Park office as headquarters immediately after the first temblor. Service crews were brought from other offices and handled customers' calls as fast as they came in.

While this work among consumers in the affected areas was getting under way the company was also sending seven individual crews equipped with leak detectors to make a check of all manhole vaults in metropolitan Los Angeles. This operation began immediately, and wherever any presence of gas was noted crews were dispatched to find the cause. Three major leaks constituted the only damage to mains in the metropolitan business area. Several thousand substructures maintained by telephone and telegraph, electric, sewer, cold storage, gas and other utilities were inspected.

Starting about 8 o'clock on the night of the quake, men were routed to patrol the injured districts block by block by automobile, listening and smelling for major breaks. This work continued all night. The next morning a house-to-house survey was run by 30 men in two teams under captains, 20,000 customers being covered in 5-6 days.

Pressure charts of the L. A. G. and E. showed that many customers turned off their own gas at the time of the quake.

One of the problems encountered in restoring service where meters had been shut off came from uncensored radio broadcasts which advised gas users to turn off their pilot lights on all appliances. As a result, where pilots were turned off on thermostatically controlled storage automatic water heaters, the water cooled during the night, turning on the main burners and allowing gas to dissipate into the flues. Flashbacks caused some burns when heaters were lighted next morning.

Storage holders were of course checked, considerable loss of water in water-type containers resulting from surging when the quake rocked the holders. Leak detectors were used in checking the 15-million-foot dry-type holder for gas above the piston, but the holder was found tight.

Southern Counties Gas Co.

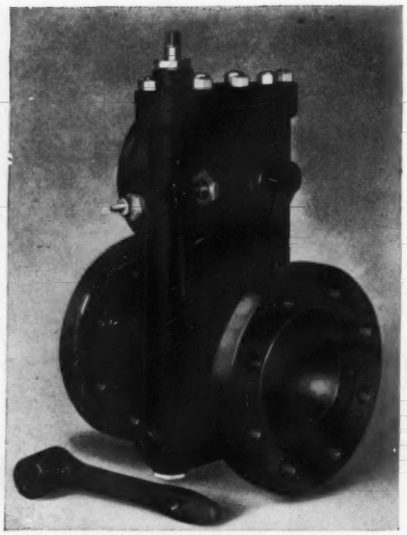
Southern Counties Gas Co. shut off only 1,600 meters as a result of the earthquake, 600 of these being at Terminal Island in the San Pedro district and most of the balance in Orange County. Gas supplies to Terminal Island, Seal Beach and Sunset Beach were cut off on Friday night and restored the following day at Terminal Island. Seal Beach and Sunset Beach were connected the latter part of the following week. Santa Ana, which was severely shaken was left on service, but meters were turned off in the business district.

At Seal Beach the city water system was put out of service and for this reason permission was refused the gas company to let gas into the mains to test for breaks. This would have meant a delay of several days in making repairs, so the company put highly odorized compressed air through its system by portable compressors to locate major breaks. Odorant was increased in gas distributed in San Pedro and Santa Ana also.

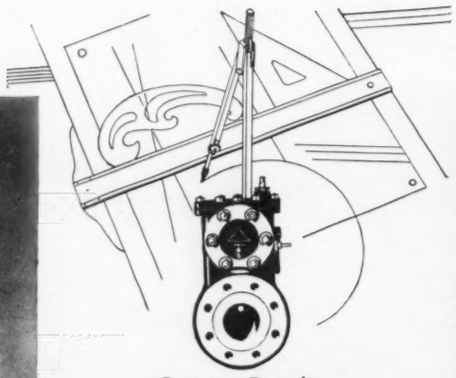
A. F. Bridge and M. R. Thompson, vice-presidents of the company in charge of operation and construction, respectively, directed an inspection of service facilities including the numerous high pressure holder units on which Southern Counties has standardized for local storage. No damage was found to these structures, except for minor evidence of strain in the vertical high pressure holders at Santa Ana. Rivets in the diagonal bracing to the supporting structures of these holders were stretched slightly in the direction of the quake's movement — northeast-southwest.

A 16-inch line of Industrial Fuel Supply Co. was broken in a number of places and a 12-inch line of Southern Counties northwest of Long Beach broke and gas ignited. It was extremely difficult to maintain service through the line to San Diego due to the Industrial Fuel Supply and Southern Counties line breaks, and gas dispatchers are to be commended for their effective work. Two lines feeding the San Diego carrier broke repeatedly, and had to be used alternately. Normal pressure at the inlet end of the San Diego line is 350 pounds, and this dropped as low as 120 pounds. Gas was off the line entirely for several hours, and San Diego Consolidated Gas and Electric Co. had its generators hot, prepared to make high B.t.u. oil gas. The line pack was sufficient to keep the city going, however, and no substitute gas was made.

Summing up the record of gas service in the earthquake area, it seems to be a clear case of hats off to Southern California gas men. The situation would have been inconceivably worse had central Los Angeles been hit, but every company as it was had its hands full either with its own restoration or rendering assistance where needed. Quick and effective organization of men and facilities, plus close company cooperation throughout, brought Southern California through with practically no accidents, speedy reinstatement of service, and a general public appreciation of the work done by gas men in this trying period.



The three-quarter view of the Lucas Orifice Fitting shows the eccentric locking device, a one-half turn of which seals off the orifice disc from line pressure at this level.



Patent Pending

TO SELL A NEW ORIFICE FITTING TODAY IT *MUST* BE DIFFERENT!

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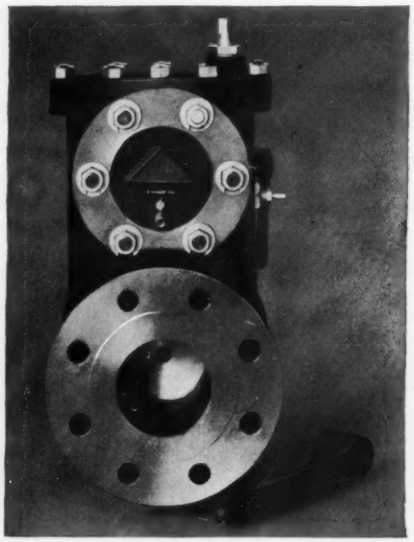
LUCAS IS



Flange end view of the Lucas Orifice Fitting from the inspection side. The Orifice is in line position positively centered and locked.

The New LUCAS FITTING Embodies the Ultimate in Orifice Design

Compact, light in weight, sturdy in construction, the Lucas Orifice Fitting adapts itself to any installation regardless of space limitations.

With the Lucas, the elevator stem no longer screws out of the top plate, but remains in position as in a non-rising stem gate valve. The orifice is midway between flanges as well as being concentric with the axis of the pipe. Because it is positively locked, the flow of gas, or liquid, may come from either direction and the installation may be made at any angle desired.

In no other orifice fitting will you find these many advantages: non-rising elevator stem; orifice disc removed through side of fitting; globe pattern valve on pressure shut-off; positive cam operated valve action; line pressure seals off orifice disc inspection chamber; all working parts stainless or alloy; complete accessibility without removing fitting from line; absolutely smooth bore without recess; orifice disc midway between flanges; direction of flow either way; face to face dimensions same as Crane standard for gate valves; elliptical body design of utmost strength.

WRITE FOR THIS NEW CIRCULAR DESCRIBING THE ORIFICE FITTING IN DETAIL.

SOUTHWEST

• • ALHAMBRA

TWENTY-FIVE YEARS OF

WELDING AND MANUFACTURING CO. INC.

CALIFORNIA • •

WELDING EXPERIENCE

MEASUREMENT and CONTROL

Alloys and Their Properties

By Wm. S. Wright

*Union Oil Company of California**

APPARENTLY the first commercial development of stainless steel alloys occurred about 1914 as the result of the extensive work of Harry Brearley on the erosion resistance of various experimental ordnance steels, although Elwood Haynes, working independently introduced a somewhat similar alloy. These products met with immediate approval of the public, which has continually demanded more and better alloys, with the result that more intensive research has been devoted to these alloys than to any other individual phase of metallurgy. It was soon realized that while these alloys were corrosion resistant they were not stainless, so countless other alloys have been developed in order to meet specific conditions or to be resistant to a wider range of corrosive agents.

No longer is it possible for you to call your steel jobber, order a piece of stainless steel, install it in your equipment, and expect to obtain satisfactory service. Undoubtedly many of you have seen instances where a stainless steel has become seriously corroded when exposed to conditions which exceeded its limitations. No one alloy can meet all corrosive conditions, and each application is a problem in itself, requiring careful investigation, with the subsequent variation of physical and chemical properties to meet the prevailing conditions. Rarely is it possible to use the ideal alloy from the standpoint of corrosion and heat resistance, on account of the other factors involved, such as strength, ease of fabrication, machinability, workability, stability under prevailing conditions, and cost. It is necessary to compromise, and it is only on this basis that satisfactory service may be obtained.

Classes of Stainless Steels

When freed from the various trade names, it will be found that the majority of the stainless steels on the market at the present time may be divided into quite general classifications: those containing chromium, and those containing both chromium and nickel. Of course there are countless alloys available, but in general they are merely modifications of these two basic classes, in which one or more additional alloying elements have been added for the improvement of some of the properties of the alloy. Without going into details, it may be said that these two classes are quite different both metallurgically and physically, and it is only from a knowledge and the consideration of these fundamental differences that it is possible to select the proper alloy for any given application.

The simple chromium alloys may be divided into several different classes based on their chromium and carbon contents, as well as the possible addition of other elements. The original Brearley and Haynes steels contained in the neighborhood of 13 per cent chromium and from 0.30 to 0.40 per cent carbon. Heat treatment was necessary to develop the corrosion resisting properties, since when slowly cooled a complex chromium carbide separated which removed a large amount of the chromium from solution in the iron. In addition the separated carbide introduced the possibility of electrolytic action because of the lack of homogeneity of the material. Heating these alloys to high temperatures and quenching in water causes the solution of these carbides, and develops the maximum corrosion resistance. This class of stainless alloy is still used where hardness and resistance to wear are desirable, but it is not suitable for use at elevated temperatures, because of this tendency for separation of chromium carbides.

Since low carbon ferrochrome has become available, alloys have been prepared which have practically the same chromium content as the Brearley and Haynes steels, but with carbon contents below 0.15 per cent. These alloys are much less susceptible to heat treatment than the higher carbon material, and have been applied to many different services. If the chromium content is increased to approximately 16 per cent and the carbon content decreased to below 0.10 per cent, the most easily fabricated of the plain chromium alloys is obtained. This material is not hardenable by heat treatment, is quite ductile, and may be fabricated readily. Temperatures as high as 1600 degrees F. do not cause excessive oxidation, but the use of this alloy at elevated temperatures is somewhat restricted by the development of brittleness after prolonged exposure. When the chromium content is increased still more, generally to 20 or 30 per cent, the material becomes resistant to oxidation at temperatures as high as 2100 degrees F., but this alloy has even a more pronounced tendency for the development of brittleness after exposure to elevated temperatures. This brittleness mitigates against the use of this material at elevated temperatures where it is required to sustain appreciable loads or is subject to shock. All of these plain carbon steels may have additions of appreciable quantities of other elements which are added in an attempt to improve the qualities of the alloys.

There is another simple chromium steel which is receiving great attention at the present time, especially in the oil industry, and that is an alloy containing anywhere from 4 to 7 per cent chromium with or without the molybdenum or tungsten. While this steel is not even rustless, it has materially reduced corrosion by hot oil and oxidation at elevated temperatures by hot flue gases. It is possible to manufacture all types of rolled, forged and cast equipment from this low chromium alloy, and while its air hardening properties complicate welding, it is entirely possible to fabricate equipment and make sound joints, but the welded equipment must be annealed before use. Molybdenum or tungsten are frequently added for the purpose of increasing the strength at elevated temperatures, and in addition they have been found to have a beneficial effect on the corrosion resistance. On the basis of data collected from commercial applications of these low chromium steels, their corrosion rate in hot oil is anywhere from 1/5 to 1/10 that of plain carbon steel, and the cost is only about three times as much. The alloys containing molybdenum and tungsten are a comparatively recent development, so no definite data are available from actual plant installations. Present indications, however, favor the use of molybdenum rather than tungsten.

In order to develop greater corrosion resistance and greater stability at elevated temperatures, alloys have been developed which contain appreciable quantities of nickel in addition to the chromium. The most popular alloy of this type contains approximately 18 per cent chromium and 8 per cent nickel, and is available under many trade names such as Allegheny Metal, KA2, 18-8, etc. It has been found that by adding this amount of nickel, the crystal structure of the alloy is changed, and the material becomes non-magnetic. This alloy can be hardened only by cold work, maintains its strength very well at elevated temperatures, and is exceedingly resistant to many corrosive conditions. As in the case of the plain chromium steels, there is a marked tendency for the separation of chromium carbides when the alloy is exposed within certain temperature ranges and becomes very serious between 1200 and 1600 degrees F. These carbides have a tendency to separate at the grain boundaries and cause the alloy to become quite brittle. In addition, they render it susceptible to intergranular corrosion, since the segregated material is preferentially attacked in many corroding media with the resultant disintegration of the metal. In order to inhibit this carbide precipitation, many heat treatments and addition agents have been proposed, and while some of them have apparently reduced this precipitation, these

* Presented before the Southern California Meter Association. December 22, 1932.

alloys should not be used in the range 1200 to 1600 degrees F., if it is necessary for them to sustain large loads or withstand vibration or shocks. Contrary to the behavior of ordinary steels, these alloys are softened by heating to high tempeartures and quenching in water. Other alloys with still higher chromium and nickel contents are available, and while they are relatively quite extensive, they have found many industrial applications, especially in the temperature range 1500 to 2100 degrees F.

All of the high chromium and chromium-nickel alloys are difficult to machine, so this has caused the development of the free-machining alloy in which sulphur or selenium is added. As in the case of sulphur in screw stock, these additions permit easier machining and materially reduce tearing. It is reported that the effect on the strength and corrosion resistance of the alloys is negligible.

Many special alloy cast irons have been developed which have shown remarkable resistance to many corrosive conditions, but even in these alloys the most common additions are chromium and nickel. Cast irons with high silicon contents are being used successfully for resistance to sulphuric acid and similar materials. The use of all these irons is limited by their inherent brittleness and their tendency for growth when exposed to even moderately elevated temperatures. By adding steel to the charge during their manufacture, special irons have been produced which have greatly improved properties. Tensile strengths as high as 100,000 pounds per square inch have been obtained, and it is possible to produce material which shows practically no growth when exposed to temperatures up to 1500 degrees F.

Non-Ferrous Alloys

The non-ferrous industry has also been engaged in intensive research work, with the result that many new alloys have been developed within recent years. In general, these alloys do not fall into definite classes so only three or four of the better known will be discussed. Illium is a complex alloy containing the following elements: nickel, chromium, copper, iron, molybdenum, manganese and tungsten, with nickel and chromium comprising approximately 79 per cent of the total. This alloy is only available in the form of castings and is quite difficult to machine. Monel metal is essentially a nickel-copper alloy containing minor percentages of iron, manganese and silicon. It is quite resistant to many corroding media and possesses many advantages since it is available in practically any form and is readily fabricated into equipment. The nickel silvers are copper, nickel and zinc alloys in which copper is the predominating element. The brasses are largely copper and zinc but frequently contain small amounts of other elements, while the bronzes are generally copper, tin, frequently zinc, occasionally lead, and usually relatively small amounts of other elements. There are several nichromes available, but in general, they are alloys which contain as high as 80 per cent nickel, with chromium up to 20 per cent and relatively small amounts of iron, silicon, copper, manganese and molybdenum. The utilization of these non-ferrous alloys is even more dependent upon a study of the individual conditions than in the case of the ferrous alloys.

For many installations it is impractical or impossible to fabricate all of the equipment from a corrosion resistant alloy, so it is necessary to use protective coatings to prevent contact between the corroding medium and the metal in question. In almost every case the success of such a protection is dependent upon how impervious it is to penetration by the corrosive agents. The most common types of protective coatings are paints, lacquers and related products, but since they are in a field by themselves, no further consideration will be given to them. Frequently there is need for a temporary protective coating, especially during the past few years when there has been so much idle equipment. This has led to the development of slushing oils, which are generally mineral or animal greases which are spread over the surfaces to be protected. Lanolin, petrolatum or petroleum greases are the main constituents, although small amounts of corrosion inhibitors such as chromates, silicates, phosphates or complex organic compounds are frequently incorporated.

Comparatively recently a protective coating has been developed which is applied by heating the iron or steel in a mixture of phosphates, which results in the development of a tightly adherent phosphate film on the surface. This treatment is called Parkerizing, while a somewhat similar treatment given to metal which is to be painted is called Bonderizing. It is claimed that this latter treatment makes the paint stick better, and in addition, should the paint film be broken, the exposed metal would be protected from corrosion.

Metal spraying is another coating process which is receiving considerable attention at the present time, although it was originally introduced many years ago. In this process the carefully sand blasted metal surface is sprayed with molten metal which is blown onto the surface at such high velocity that it is caused to adhere. The bond is purely mechanical since no fusion of the base metal occurs, so the surface of the metal to be sprayed is frequently roughened with a sharp pointed tool in order to develop a key to improve the bonding. At the present time aluminum, zinc, lead and stainless steels are being successfully sprayed and have proved to be effective protective coatings for many corrosive conditions. This process is also being used for building up of worn shafts, in which case, carbon steel, alloy steel, or some of the wear resisting alloys may be used.

Metal Plating

The protection of metal surfaces by plating is quite familiar to every one, as at the present time most all of the common metals may be applied in this manner, and even rubber is being successfully deposited by plating. Copper, nickel, silver, gold, and chromium plating are probably the most common, and of all of these chromium plating is probably the one of most interest to every one, since so much of the brilliance of the modern automobile is due to its use. To be of value for decorative purposes and to afford satisfactory corrosion resistance, it is essential that the base metal surface be covered by a copper and a nickel coating prior to the application of the chromium. These underlying coats must be highly polished if a brilliant finish is to be obtained, since the chromium coating given the average automobile accessory is so thin that any imperfection would be readily detected. It is essential that no coarse abrasives be used on chromium plate, since while the chromium itself is hard, the underlying coats are relatively soft, and the entire composite coating may be seriously damaged by improper polishing.

Aluminum is widely used for parts requiring light weight, but where strength as well as lightness is required, alloys of the duralumin and magnesium type are available. When properly heat treated, these alloys exhibit physical properties which compare very favorably with high quality steels. While aluminum itself is quite resistant to many corrosive conditions, duralumin is but slightly resistant, and is especially susceptible to salt water. Since one of the chief uses of this alloy is in aircraft which are frequently exposed to such conditions, an aluminum clad duralumin has been developed which has largely overcome these corrosion difficulties. The corrosion resistance of aluminum is largely due to the formation of an extremely tenacious and impervious film of oxide which effectively protects the underlying metal from further attack. It has been found that the protective action of this film may be made even greater by making the aluminum the anode in an oxidizing electrolytic bath. Even duralumin shows marked corrosion resistance when treated in this manner.

One of the oldest treatments given to steel was hardening, which was accomplished by heating it and then quickly quenching in water or oil. The hardness which could be developed in this manner was governed by the general composition of the steel, but was chiefly affected by the carbon content. The higher the carbon content, the greater the hardness which could be developed, but also the greater the brittleness, which was increased to a very serious extent. In order to avoid this difficulty, case hardening was developed in which a hard shell was formed while the core remained tough and comparatively soft. These changes were produced by packing low carbon steel in carbonaceous material, and heating it to elevated temperatures for a sufficient length of time to permit the carbon to penetrate the steel to the desired depth. This material must then be heated and quenched to impart the desired properties, which results in considerable distortion. Any dimensional changes can only be made by grinding because of the extreme hardness of the surface. The recent development of the nitriding steels has obviated these difficulties to a large extent, since parts may be machined to final dimensions prior to hardening. In general, medium to low carbon steels containing approximately 1 per cent of aluminum and chromium are used for this purpose. They are hardened by heating in an atmosphere of ammonia gas at temperatures between 900 and 1200 degrees F. for periods up to 90 hours. The hardness of the surface is in excess of 1000 Brinell, is extremely resistant to wear and is somewhat more resistant than ordinary steels to many corroding media.

For machining operations, there are many types of tool steel available including the high speed steels which have been operated

at a dull red heat without seriously damaging their cutting edge. More recently the tungsten carbide tools have been introduced, and it has been found that their hardness approaches that of the diamond, but because of their brittleness it is necessary that any cutting edge be adequately supported. The use of these super hard materials has revolutionized many machining operations.

It may be of interest to recall the peculiar properties of two or three of the high nickel steels. The first of these is Invar which contains approximately 36 per cent nickel and has an extremely low coefficient of expansion. It is widely used in clocks and watches, as struts in aluminum alloy pistons and in many similar services where it is desired to have a material without dimensional changes over a moderate temperature range. Another alloy called Platinite, which contains 46 per cent nickel, has been found to have practically the same coefficient of expansion as glass and has been used as lead in wires for incandescent lamps, although it has since been displaced by a copper coated 38 per cent nickel steel wire which has been found to be more satisfactory.

From this brief discussion, it is evident that there is a wide range of metals and alloys from which to select materials for any given application. It cannot be emphasized too strongly that there is no all purpose metal which will meet all conditions and services, and that careful consideration must be given to all factors before making any selection of materials. It is only in this manner that satisfactory service can be obtained and the large economic loss due to misapplication eliminated, or at least reduced to within reasonable limits.

The Lucas Orifice Fitting

By A. E. DeBurn

*Southwest Welding & Mfg. Co., Inc.**

THE Lucas orifice fitting is being released by the Southwest Welding & Mfg. Co., Inc., to round out its line of Papico orifice meter runs, straightening vanes, and screwed steel orifice flanges. The ability to change orifice discs without interrupting the line flow, the principle of all orifice fittings, has been speeded up and simplified. Safety to the operator and protection to the moving parts of the fitting are given primary consideration in the design.

A. E. DeBurn

Certain salient features of the fitting are: A non-rising elevator stem for the orifice disc carrier; permanent top cover plate; changing of orifice brings no part of the fitting above top cover plate; line pressure seals orifice inspection chamber from body; quick detachable cover on inspection chamber; main valve globe type, cam-actuated; orifice discs interchangeable with those of other manufacturers; elliptical body design lightens weight; orifice disc central between flanges.

Lucas orifice fittings are made in all nominal pipe line sizes and are carefully bored to conform to the internal diameters on which coefficients are based. Pressure ratings are 125 lbs. standard and 250 lbs. extra heavy for fittings cast from Kaloy, while the 150 lbs. to 600 lbs. standards are cast from steel.

The elliptical body design gives the utmost in strength, eliminating the use of reinforcing ribs, and reducing weight. All models follow this design, and those of Kaloy have the marked advantage of this 45,000 lbs. tensile strength alloy. Kaloy is of extremely close grain structure, with a correspondingly increased resistance to abrasion and corrosion over cast iron. Its freedom from hard spots or blow holes makes its finished machined surfaces ideal. The use of Kaloy increases the serviceability of Lucas fittings in the standard or extra heavy types for higher temperatures and pressures. Cast steel is employed for those subjected to extreme conditions.

Flange dimensions conform to the American Standards Association bulletin dated November, 1932, and the backs of all flanges are faced.

Compactness is noticeable. The face-to-face dimensions of Lucas orifice fittings are the same as Crane Co. standards for gate valves of similar pressure up to 12 inches I.P.S.

*Presented before the Southern California Meter Association, March 23, 1933.

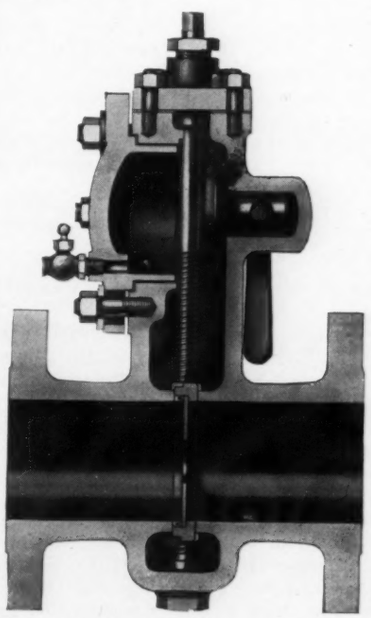


Fig. 1.

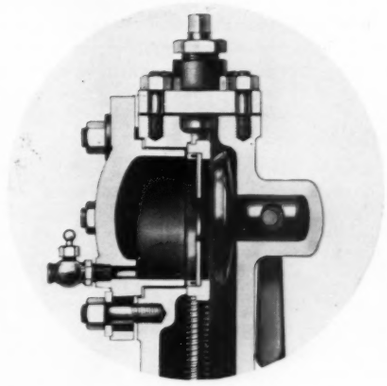


Fig. 2.

One notable feature is that the orifice disc is midway between the two flange faces. The fitting can be placed either way in the line regardless of direction of flow and without previous consideration. This is ideal for reverse flow conditions. The feature of compactness is advantageously carried out in the overall height. Not only is this height at a minimum, but in changing of orifice discs no part comes above the original installed height limit.

Operation

The operating principle of the fitting is explained as follows:

Referring to the drawing (Fig. 1) the orifice disc carrier is shown in its line position. The ⅛-inch thick orifice disc is clamped in the carrier by a spring ring. The upward movement of the orifice disc carrier is effected by rotating the elevator screw. It is located at one side of the carrier so that the stem itself need not lift as the orifice is drawn into the upper position. Because this elevator screw is the non-rising stem type, no excess head room is needed above the fittings to change plates, nor is the screw ever exposed to damage.

With the disc carrier in its raised position (Fig. 2) against the positive stops, the actual orifice disc removal takes place through the side of the fitting. Here again, all operations are below the overall height line.

Raising the permanently attached eccentric handle in a 180-degree arc advances the globe valve against the orifice disc carrier, and forces its other side against the seat prepared around the inspection chamber. This seals off the inspection chamber. Its pressure is then bled through a pet-cock, creating a differential which brings the entire line pressure to bear against the globe valve disc, tightening it without mechanical assistance.

The cover over the inspection chamber can now be removed with ease and safety. This is accomplished merely by loosening the nuts, slipping out the slotted washers and lifting the cover off over the small S.A.E. nuts. In the larger models mechanical means of supporting the weight of the cover when removing are provided. The orifice disc is removed by pulling it straight out.

The replacing of the orifice is the above cycle reversed with this one point particularly noted: After the removable cover has been replaced and tightened against its copper gasket, it is necessary to open an equal-

izing valve. This admits line pressure to the inspection chamber to equalize the pressure on both sides of the globe valve disc. Otherwise the line pressure which is holding this valve closed may exert so much force that it is impossible to thrust the globe disc back.

Features incorporated in the design of the Lucas orifice fitting which are of particular interest are covered in the following explanation:

The non-rising elevator stem is of stainless steel, with an acme thread. The stainless steel bottom bearing is permanently screwed into the main body casting. The top bearing is in the permanent cover with an adequate stuffing box. Thus both bearings are fixed in position and permanent alignment.

The top cover plate of the fitting need never be removed, yet all working parts can be inspected through this opening if necessary without removing the fitting from the line.

The removable cover plate on the side is dome-shaped, and its adequate skirt guides and centralizes it while inserting the slotted washers. This skirt extension also holds the orifice disc and clamping ring in proper position while lowering the disc carrier.

The equalizing and bleeder valves are needle type for certain seating and tightness.

The eccentric handle is permanently attached and an arrow indicates the movement of the internal globe valve disc.

This globe valve is made from alloys fully protecting it from corrosion, and its globular shape assures universal seating and alignment.

The cam operating the valve is of stainless steel.

Stops for the orifice disc carrier are cast into the main body and are machined at the same time the fitting is bored. This positively centers the orifice disc carrier in its top and bottom position. The lower stops are well above the bottom sediment chamber and on a 90 degree angle so they will remain clean. In the manufacturing process the disc carrier is run down against the previously machined bottom stops and then bored out while in this position. This eliminates any chance of recesses in the finished bore and assures absolute concentricity. One-half-inch I.P.S. pressure tap connections are located 1 inch each way from the centerline of the orifice disc. Three-eights-inch holes are drilled from these straight through the body only, into the bore. These are at right angles to the line of flow, and horizontal.

The sediment chamber is of ample size and has a drain connection on each side, permitting cleaning straight through. The Lucas fitting can be set horizontally either way, and one drain is always down.

The close limits allowed in machining the orifice disc carrier, disc, and disc-retaining ring make them seat perfectly in the line. The 100 lbs. pressure of the spring retaining ring seals against by-passing from the differential of pressure. The position of the orifice is always in positive control because the plate carrier is permanently attached to the non-rising elevator stem.

Missouri Assn. Plans Business Conference

THE 1933 convention of the Missouri Association of Public Utilities will be held April 27 and 28 at Hotel Jefferson in St. Louis, Mo. The program committee has designated this annual meeting as "a business conference" of utility leaders.

Because of economic conditions, the meeting will be held for two days this year instead of the usual three days. Some of the entertainment activities will be dispensed with this year, and business sessions will be held each morning and afternoon. The opening session will be called to order by President A. E. Bettis at 10 a. m. on April 27. The annual dinner and dance will be held on the night of April 27.

Several nationally known speakers will make addresses on utility subjects of timely importance. Many local utility executives will make addresses and take part in the Open Forum discussion to be held in the afternoon, April 28.

The program is being arranged by the following committee: C. J. Prashaw, Missouri Power & Light Co., chairman; Dudley Sanford, St. Louis County Gas Co.; H. E. Scheark, Kansas City Power & Light Co.; R. L. Shuck, Springfield Gas & Electric Co.; H. C. Porter, St. Joseph Railway, Light, Heat & Power Co.

The entertainment program is in charge of: Paul C. Ford, Chairman, Kansas City Gas Co.; Hermann Spoehrer, Union Electric Light & Power Co.; R. D. Lewis, Laclede Gas Light Co.; L. W. Helmreich, Capital City Water Co.; J. B. Rogers, Missouri Power & Light Co.; J. M. Strike, St. Joseph Railway, Light, Heat & Power Co.; John Casey, Graybar Electric Co.

The advance reservation of hotel rooms will be in charge of Jesse Blythe, Assistant Secretary of the Association, Jefferson City, Mo. About 250 delegates are expected to attend.

Cooking School at Fort Worth Attracts More Than 1900 Women

The Fort Worth Division of the Lone Star Gas Co., conducted a four-day cooking school from February 28 to March 4, under the direction of E. C. Whitcomb, new business manager, W. F. Wright, manager, Fort Worth Division, and Albertine Berry, home service director for the company. The school was attended by more than 1900 women. A special kitchen setting has been installed in the auditorium of the company and was used in the demonstration work. At the final session of the school a gas range was awarded as a prize, being won by a woman who had not previously used gas for cooking.

March 23 Meeting of So. Calif. Meter Association

"STANDARDIZATION of Deviation Factors in Gas Measurement" was the title of a paper by B. G. Williams of the Southern California Gas Co., given before the March 23 monthly dinner meeting of the Southern California Meter Association. The meeting was held at Taix French Restaurant, Los Angeles. Following his paper Mr. Williams passed out a set of curves and tables to those present at the meeting. These were prepared by the author and G. A. Reece of the Southern Counties Gas Co. and are designed to standardize factors of deviation from Boyles Law as applied to gas measurement by orifice meters in form for use from tables rather than curves. The paper, together with the standard deviation tables, will appear in *Western Gas* for May.

The second paper of the evening was a description of the design and operation of the Lucas orifice fitting, presented by A. E. DeBurn of the Southwest Welding and Mfg. Co. One of the fittings was on display, and slides also illustrated its construction. The paper appears in this issue.

Golfers Near Jubilee Tournament

Golfers of the association on March 26 played the 12th tournament in competition for the S.C.M.A.-*Western Gas* Goodfellowship Trophy, completing the series of monthly competitions with this cup at stake. A. E. DeBurn was the winner of the last play, which took place at Rio Hondo Country Club. With 12 members having names on the cup plans are now under preparation for the Jubilee Tournament which will decide its permanent possession. The playoff will probably come on the Saturday afternoon following the April meeting of the Association, and will give opportunity to all S.C.M.A. golfers to compete for a general list of prizes.

New Operating Set-up Reported for Montana Companies

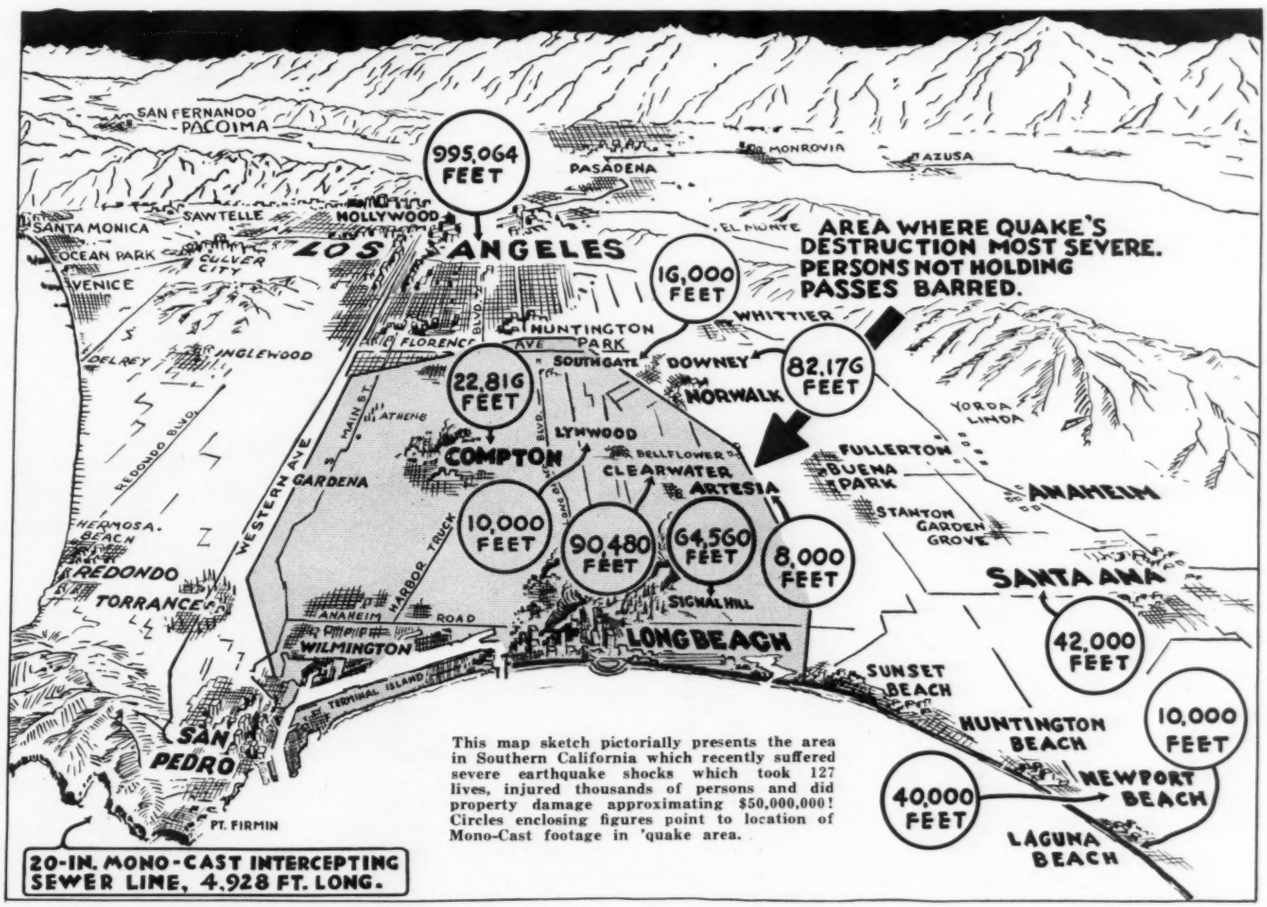
Formation of the Montana Power Gas Co., a subsidiary of the American Power and Light Co., New York, has been announced in the Montana press.

According to report, the new corporation has taken over from S. W. Staplin, New York City, all lands, leases and equipment in the Cut Bank field, the gas transmission line from Cut Bank to Butte and Anaconda, contracts to purchase natural gas from Ohio Oil Co. in the Dry Creek field, contracts to furnish gas to Montana Power Co. for distribution, and contracts for supplying the Anaconda Copper Mining Co.

At the same time the Montana Power Co. took over from the Staplin interests all city distribution plants in the territory.

The S. W. Staplin interests in 1931 acquired the properties and contracts in the Cut Bank area as a nominee of the American Power and Light Co. when that company bought the interests of L. B. O'Neil. Properties in the Dry Creek area were purchased at the same time by the Staplin interests from the Ohio Oil Co., including the gas transmission line from Dry Creek to Livingston, Bozeman, Big Timber and Columbus, Mont.

1,386,024 Feet of MONO-CAST PIPE in 'Quake Area Undamaged by Shocks Which Destroyed Substitutes



This map sketch pictorially presents the area in Southern California which recently suffered severe earthquake shocks which took 127 lives, injured thousands of persons and did property damage approximating $50,000,000! Circles enclosing figures point to location of Mono-Cast footage in 'quake area.

SOUTHERN California earthquake shocks which caused many breaks in pipe lines composed of substitutes for cast iron pipe, left Mono-Cast pipe lines practically undamaged! The following facts have been advanced as the logical reasons for this splendid performance:

REASON NO. 1: Due to the Mono-Cast method of *centrifugal casting against sand*, Mono-Cast Pipe is exceptionally strong and tough, though soft and bendable. Its metal structure is remarkably homogeneous, and it is entirely free of casting strains, inclusions, blowholes or other defects.

REASON NO. 2: Practically all of the 1½ million feet of Mono-Cast Pipe in the 'quake area is equipped with the *bell and spigot* joint. When a line of pipe equipped with this joint is subjected to a pull sufficient to break the pipe, the bell and spigot joint can relieve the pull by separation.

Pipe manufactured by the Mono-Cast Centrifugal method are furnished for water, sewage, gas, oil, and general industrial and building piping. This pipe is now successfully carrying gas pressure approximating 400 pounds. Write nearest Acipco office for detailed literature.

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM, ALABAMA

CHICAGO DALLAS KANSAS CITY NEW YORK CITY SAN FRANCISCO CLEVELAND LOS ANGELES MINNEAPOLIS SEATTLE

MADSEN

IS OLYMPIC CLUB CHOICE

San Francisco's famous Olympic Club, quite as noteworthy for its cuisine as for athletic achievements, has joined the distinguished roll of Madsen users. Three 1933 stream-line model Madsen ranges . . . Series 34-H, with insulated ovens . . . are now giving championship service in Olympic kitchens. Why not make your kitchen a winner? Write for details.

M A D S E N
IRON WORKS, LTD.

P. O. Box 601, Huntington Park, Calif.
(Suburb of Los Angeles)
MADSEN HOTEL AND RESTAURANT KITCHEN EQUIPMENT
Sold by Leading Equipment Dealers

Dependable

A.G.P.

Products

IDEAL BOILERS

A. G. P. WATER HEATERS

A. G. P. SPECIAL WATER HEATERS

THE "DICTATOR" LOW-PRICED WATER HEATERS

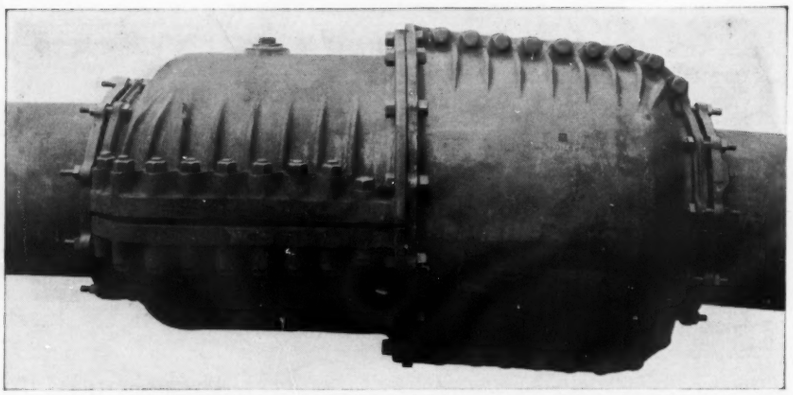
A. G. P. REDFLASH CONVERTORS

A. G. P. STEAM RADIATORS UNIT-OR HEATERS

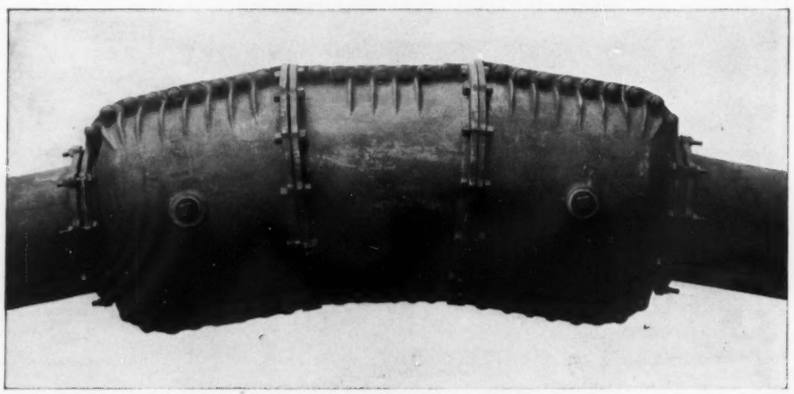
Of course! All Gas-fired and Fully Automatic!

AMERICAN GAS PRODUCTS CORPORATION

40 West 40th St. New York, N. Y.
Division of
AMERICAN RADIATOR COMPANY



Sleeve assembled in two sections, rotated to cover angular bend of 4 degrees 17 minutes, for emergency repair of high-pressure natural gas line.



The new split sleeve, shown assembled in three sections to produce maximum angle of 20 degrees 0 minutes.

Adjustable Angle Split Sleeve by Dresser

S. R. DRESSER MANUFACTURING CO. has announced the development of an adjustable angle split sleeve which can be applied to various lengths of pipe and angles of bends in the repair of high pressure natural gas lines.

This new split repair sleeve is of rigid, cast construction, available in sections which can be joined together to cover any length of bend. The fact that the sections can be rotated to different positions makes it possible to adjust the sleeve for various angles up to 20 degrees. The same sleeve can be used with either two or three sections, depending on the length of the bend and the angle desired.

By rotating the sections of the two-section sleeve, the following angles can be obtained:

Position	*Angle*
1	0° 0′
2	1° 26′
3	2° 51′
4	4° 17′
5	5° 43′
6	7° 8′
7	8° 34′
8	19° 0′

A three-section sleeve may be rotated to produce the following angles:

Position	*Angle*
1	0° 0′
2	2° 51′
3	5° 43′
4	8° 34′
5	11° 27′
6	14° 17′
7	18° 24′
8	20° 0′

Consolidate Plant and General Offices at Terre Haute, Ind.

Indiana Consumers' Gas and By-Products Co. announces the removal of its main offices in Terre Haute from the Chamber of Commerce Bldg., to the company's plant at 13th and Hulman Streets, centralizing its operating activities in Terre Haute.

Fields Transferred to Omaha

W. J. Scott of Kearney, Neb., has been appointed manager for Peoples Natural Gas Co. at Fairbury, Neb., succeeding Earl Fields who has been transferred to company headquarters at Omaha. Peoples Natural is a distribution subsidiary of Northern Gas and Pipe Line.

"... let's buy one of the new
AUTOMATIC WATER HEATERS
Mr. Boss."....
"A grand idea," replies Mr. Boss, "the old heater is too slow. Funny we put up with it so long."
"Just the thing too," adds Mrs. Boss, "to get the dishes and the washing done quicker."
"We'll call it our Spring investment," adds Mr. Boss with finality.
SEE YOUR DEALER ON THE
P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY
Owned · Operated · Managed by Californians

MAKE THIS TIME CHECK!
... PROVE THAT YOUR HOME NEEDS "ON TAP SERVICE" OF Automatic Hot Water
SEE YOUR DEALER OR THE
P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY
Owned · Operated · Managed by Californians

PERHAPS YOU HAVE SLOW SERVICE OF HOT WATER IN YOUR HOME
Correct this situation for as little as $4.85 DOWN FOR AN Automatic Hot Water Heater
SEE YOUR DEALER ON THE
P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY
Owned · Operated · Managed by Californians

No more "lighting the water heater"
...Yet this Automatic Storage Type costs less per gallon to operate
SEE YOUR DEALER ON THE
P·G·and·E·
PACIFIC GAS AND ELECTRIC COMPANY
Owned · Operated · Managed by Californians

DO PROSPECTS KNOW WHO *You Are*—WHERE *You Are?*

To Increase Your Water Heater Sales USE TIE-IN ADVERTISING

The current P. G. and E. advertising campaign, promoting the installation of Automatic Gas Water Heaters, is tuned to the appeal of replacing old-fashioned tank type water heaters. The advertising in copy and illustration tells the story of match-striking, slow service, "tank-patting," and waiting for water to heat. These disadvantages of the tank type are contrasted with the modern convenience of low cost HOT WATER service from Automatic Water Heaters . . . storage type.

The entire advertising campaign (March, April, May) is designed primarily to build public DESIRE for Automatic Hot Water service. The campaign does not specifically *sell* Automatic Gas Water Heaters. The job of *selling* the prospects created by this advertising, purposely is left open to the local gas appliance dealer. Prospects are invited to dealers' stores.

As the advertising messages are appearing regularly in the homes of more than one million P. G. and E. customers, aggressive dealers find it profitable to direct prospects to their stores through tie-in advertising. They are publishing their own advertising beside each P. G. and E. newspaper advertisement. Such tie-in advertising gives the prospective buyer what he needs and wants to know—WHO is the local dealer who sells Automatic Gas Water Heaters, and WHERE is his store.

Build up a profitable percentage of Automatic Water Heater sales during this greater Spring campaign. Consult your local newspaper publisher about tie-in advertising. It's the most effective method of telling the greatest number of prospects that YOU are the dealer our advertising invites them to see.

WG 204-433

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

OWNED . OPERATED . MANAGED BY CALIFORNIANS

Will Definitely Control
SLIGHT PRESSURES . . . .
. . . . LIGHT VACUUMS

IN a pipe line used with a suction pump for movement of casing-head gas, or in similar use, the pump will never pull a vacuum greater than the allowable equivalent of a fraction of an inch of water, if the Fulton-Duplex Sensitive Vacuum Regulator is installed. This regulator can be made to serve equally well as a back-pressure regulator, to control slight pressure instead of light vacuum by proper adjustment of weights. Ask for circular. Correspondence is invited.

The Chaplin-Fulton Manufacturing Company

28-40 Penn Ave. Pittsburgh, Pa.

Fulton Duplex Vacuum Regulator

NO-OX-ID
IRON-RUST
The Original Rust Preventive

Profit by the Other Fellow's Experience

No use for even the "man from Missouri" to conduct experiments with NO-OX-ID any more. All tests show the same results. For fifteen years NO-OX-ID has been proven in superiority for the gas industry. Low in first cost. Easy to apply. Long time, reliable protection.

The outcome of tests with NO-OX-ID are convincing to the engineer, but we can put evidence in your hands based on hundreds of previous tests and save you the deterioration on gas holders, gas lines and auxiliary equipment, and the large difference in cost between NO-OX-ID and other materials.

Now can NO-OX-ID serve you?

DEARBORN CHEMICAL COMPANY
LOS ANGELES:
807 Mateo Street, Phone TRinity 3385
SAN FRANCISCO
421 Bryant St., Phone SUtter 8688

FRASER
GAS APPLIANCES AND FURNACES

Announcing—

Two New Large Capacity

FLOOR FURNACES

No. 135 —50,500 B. T. U. Input
No. 135A—57,000 B. T. U. Input

The Complete Line now includes
7 sizes Floor Furnaces
11 sizes Basement Furnaces
2 sizes Wall Furnaces
5 sizes Pipeless Furnaces
5 sizes Console Heaters
Baked or Porcelain Enamel

Write for our new catalog and price list.

Manufactured by

Fraser Furnace Company
Stockton, Calif.
Distributed by
H. R. BASFORD CO. San Francisco Los Angeles

New Robertshaw Combination Oven Control

A new combination oven control thermostat and oven gas valve has been announced by the Robertshaw Thermostat Co. of Youngwood, Pa. This new control unit contains a standard, Model "F" Robertshaw "AutomatiCook" oven thermostat of the "dial" type.

The oven thermostat is surrounded by a chromium plate and the oven gas cock actuates below this plate, traveling from a point immediately below the plate—the "off" position—to the horizontal or "on" position. Both of these positions are marked on the plate.

By grouping these oven controls together the entire unit may be installed on the manifold panel.

Operation of the oven thermostat and gas valve remain independent of each other. Either control is accessible for adjustment or regulation without disturbing the other unit.

By separating the dial of the oven control and the handle of the gas valve the operator, in turning the dial to secure the desired temperature setting, cannot unwittingly turn the gas supply off and on.

Employees Elect Representative

Henry Frank, foreman in the construction division of the St. Louis County Gas Co., Webster Groves, Mo., has been elected by the employees of the company as their representative on the board of directors of the company.

New Line for Phillips Petroleum Co.

Phillips Petroleum Co. is completing a 10-inch gas transmission line from the West Holdenville field to its gasoline plant southeast of Wewoka, Okla., a distance of approximately 5 miles. The gas will be used in the manufacture of gasoline.

Wants to Serve Clay City, Ky.

H. B. Sipple has asked permission to serve natural gas in Clay City, Ky. The Sipple interests are now serving gas in Stanton, Ky., and plan to extend their service area.

New Distribution Mains in Atlantic

Construction got under way late in March on a belt line around the business district of Atlantic, Iowa, the work to be completed by May 1, at a cost of approximately $10,000.

Cathodic Pipe Protection

(Continued from Page 22)

The opposite conditions also exist as shown by the coupons (a), (b) and (c). In the latter cases, a soil corrosivity would have given information that would have caused the line to receive too light an insulation.

This indicates that soil corrosivity is the dominating factor in determining the life of pipes in city networks or other localities in which each pipe length is an individual piece of metal, due to screw connections, and high resistance joints.

Soil currents are the controlling factor in long continuous lines such as the welded transmission lines.

Our surveys have shown that approximately 50 per cent of our transmission lines are positive to the soil and an equal amount negative, resulting in a large number of cathodic areas in which the pipes corrode at a lower rate than would be the case if soil corrosivity alone were the controlling factor.

In making surveys the type of line should be taken into consideration in deciding between a soil current and soil corrosivity survey. The two methods can be used to supplement each other to advantage in many cases.

Five Oklahoma Men Named to Board of Oklahoma Natural

Frank E. Kistler, chairman of the board of Oklahoma Natural Gas has announced the election of five Oklahoma men to the board of directors. The new members are A. L. Farmer, Walter Ferguson, Wilbur T. Funk and Dudley D. Morgan of Tulsa, and Charles W. Gunter of Oklahoma City. Other board members are Mr. Kistler, Robert W. Hendee, president; W. K. Cottrell, secretary-treasurer, and R. C. Allen, general counsel.

Mr. Farmer is a member of the insurance and real estate firm of Farmer & Duran, and is a director of the First National Bank & Trust Company of Tulsa.

Walter Ferguson is vice-president of the Exchange National Bank of Tulsa, and a director of the Federal Reserve Bank at Oklahoma City.

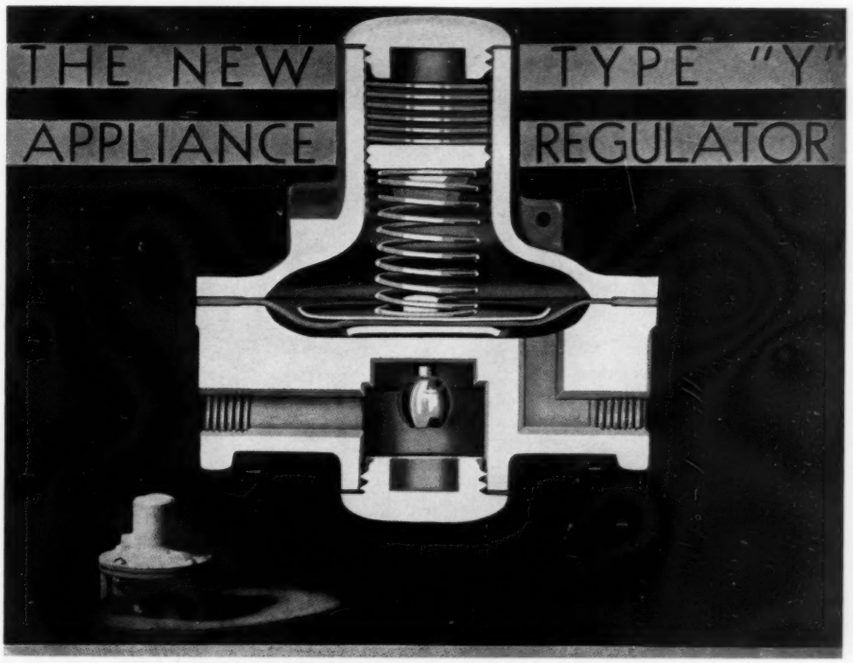
Wilbur T. Funk, a native of Titusville, Pa., entered the oil and gas business in 1894. From that time until July 1, 1932 he was connected with the Standard Oil Co. of New Jersey and its affiliated gas operating and pipe line companies. His first connection was with the Tidewater Oil Co. and he later was successively with the Indiana Pipe Line Co., the East Ohio Gas Co., the National Fuel Gas interests, in the general auditing department of the Standard of New Jersey handling oil, gas and pipe line accounting and then with the Carter Oil Co.

Dudley D. Morgan is president of the Morgan Oil Co. and associated with Morgan & Flynn.

Charles W. Gunter is vice-president of the First National Bank & Trust Co. of Oklahoma City.

Atchisonville, Texas, Served

The Moran Gas Corp. of the South, Houston, Texas, recently began service of natural gas in Atchisonville, Texas.



APPLIANCE manufacturers and gas companies alike welcome the development of this new regulator. ● We invite your attention to its performance characteristics, ruggedness and simplicity. ● Now available in 1/4, 3/8, 1/2, 3/4, 1 and 1 1/4-inch sizes at attractive prices.

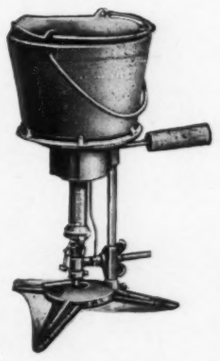
For detailed information address:

RELIANCE REGULATOR CORPORATION

1000 MERIDIAN AVE., ALHAMBRA, CALIF.

Manufacturers of Gas Regulators for All Purposes

RELIANCE



Johnson No. 8 Torch

Efficient! Inexpensive!

For melting soft metals and heating soldering coppers. Burner may be removed and used as an efficient hand torch. Write for free catalog.

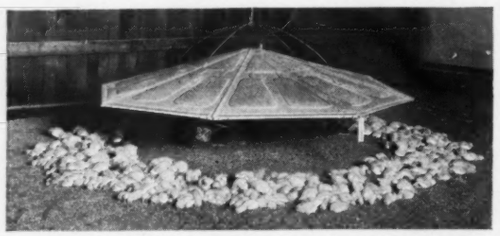
JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Pacific Coast Representative—C. B. BABCOCK CO.
135 Bluxome St., San Francisco, Calif.

GAS BROODERS

The new type Hart Radiant Gas Brooders are causing a sensation amongst poultrymen. They are proving by far the best means of brooding chicks. Increase your sales of gas by handling this leading line. Hart Gas Brooders will raise a greater percentage of chicks with less labor and expense than any other method. All brooders thermostatically controlled—hang from ceiling—teach chicks to perch—gas pipe runs overhead with flexible gas tubing running to brooder. Get your share of the vast potential fuel load for brooding of chicks and turkeys. One poultryman is worth a dozen ordinary household gas consumers.

Send at once for descriptive literature, discounts, etc.



Flashlight photograph of chicks sleeping under a Hart Gas Brooder at the world's largest poultry ranch where Hart Brooders are used exclusively. One hundred and forty-four brooders in operation the year round brooding five hundred to one thousand chicks to the brooder.

H. W. HART MFG. CO., P. O. Box 404 W, Santa Monica, Calif.

More Hart Gas Brooders are being sold on the Pacific Coast than any other make.

The Goodman Stopper

The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California

The Semet-Solvay Ignition Arch Process for Heavy Oil

Is the most interesting water gas manufacturing development in years. It makes profitable the use of low quality oils for enrichment on an extremely flexible operating basis.

Write us for full details

SEMET-SOLVAY
ENGINEERING CORPORATION

Engineers · Contractors

40 RECTOR ST. · NEW YORK, N. Y.

Geo. Dodd Named Supt. of Distribution to Succeed Lynch

GEORGE D. DODD, formerly superintendent of the Street Department of The Laclede Gas Light Co., St. Louis, Mo., has been appointed superintendent of distribution to succeed the late Eugene P. Lynch, who died February 8, following an operation.

Geo. D. Dodd

Mr. Dodd started with The Laclede Gas Light Co. 37 years ago as a meter reader and has come up through the ranks, having served in the consumers' accounting and distribution department offices, district fitting shops and street and paving departments.

Several members of Mr. Dodd's family are connected with Laclede, the father of the new superintendent of distribution having served 37 years with the company as an engineer. A brother, William S. Dodd, former treasurer of the company, who retired a year ago, was with the company continuously for 50 years.

A. E. Fitkin, Utility Pioneer, Dies at New York, March 18

A. E. FITKIN, head of the A. E. Fitkin Co., New York, died in that city on March 18 of heart disease. Mr. Fitkin, in his capacity of chairman of the board of the American Gas and Power Co. controlled the following companies:

Minneapolis Gas Light Co., Minneapolis, Minn.; Minneapolis Suburban Gas Co., Minneapolis, Minn.; Savannah Gas Co., Savannah, Georgia; Jacksonville Gas Co., Jacksonville, Florida; St. Augustine Gas and Electric Light Co., St. Augustine, Florida; Birmingham Gas Co., Birmingham, Ala.; Bangor Gas Light Co., Bangor, Maine; Penobscot Valley Gas Corp., Bangor, Maine. Lowell Gas Light Co., Lowell, Mass., is also associated with the Fitkin properties.

During his lifetime Mr. Kitkin organized and developed the National Public Service Corp., which was later sold to Day and Zimmerman, Inc., for approximately a quarter of a billion dollars. He also organized the Inland Power & Light Co. which was sold for $30,000,000 to the Insull interests in 1927.

In January, 1932, Mr. Fitkin obtained control of the American Gas and Power Co., from the American Commonwealths Power Corp. which was placed in receivership in December, 1931.

Mr. Fitkin was educated for the ministry, but after several years as a clergyman, he left that work for a business career. He gave freely of his time and money to welfare and charitable enterprises and his philanthropies were known throughout the country.

Management of the utilities properties controlled by Mr. Fitkin is in the hands of his two sons, W. C. and Ralph Fitkin of New York.

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $6.00 monthly on 12-time contract.

SITUATIONS WANTED—MALE

Situation Wanted by House Heating Engineer; 6 years with large warm air heating corporation; for past two years has specialized on conversion gas equipment, gas furnaces and air conditioning. Capable of figuring, laying out and selling central heating systems. Age 44. Married. Address Box 231, *Western Gas,* 810 South Spring St., Los Angeles, Calif.

Central West Utility Co. Incorporated to Take Over Kansas Properties

Central West Utility Co., Leavenworth, Kan., was incorporated February 27, and has applied to the Kansas Public Service Commission for permission to purchase and operate gas distribution systems in 18 cities and towns in the state of Kansas now owned by Stern Bros. Investment Co. These properties were bought from the General Utilities Co., in receivership. Properties included in the proposed deal are Bonner Springs Gas Corp., serving Bonner Springs and Wilder; Council Grove Gas & Service Co., Council Grove., Public Gas & Service Co. serving Aulne, Lost Springs, Lincolnville, Pittsburg, Ramona, Tampa; Consumers Gas & Service Co., serving Delevan, White City, Wilsey; Kaw Valley Gas and Service Co., serving De Sota, Eudora, Lake-of-the-Forest; Florence Gas & Service Co., Florence; Herington Gas Service Co., Herington; Marion Gas & Service Co., serving Marion; Moline Gas & Service Co., Moline; Peabody Gas & Service Co., Peabody; Hillsboro Gas & Service Co., Hillsboro.

Laramie, Wyo., Office Established

Headquarters for Rocky Mountain Gas Co. at Laramie, Wyo., have been set up at 406 South Second St. The company is a subsidiary of Ohio Oil Co., Casper, Wyo., which recently purchased the distribution properties of the Laramie Gas Co., formerly owned by Associated Public Service Co.

Ozona, Texas, Scheduled for Service

Franchise to serve natural gas in Ozona, Texas, and other towns in Crockett County, has been granted to M. G. Williams of Gorman, Texas, and to H. H. Shaw and H. Loomis, of Baird, Texas. Gas supply will come from the Todd Ranch 13 miles northwest of Ozona.

"MODERNIZE as you repair"

THE SPRAGUE METER COMPANY

Bridgeport, Conn.

Los Angeles, Calif. San Francisco, Calif.

Newark, Ohio.

Davenport, Iowa. Houston, Texas.

Over 10,000,000 In Use

Mile upon mile of new pipe line adds to the ever-increasing number of Paranite Gaskets now in use.

TRADE PARANITE MARK

It's safest to specify Paranite.

WRITE FOR LITERATURE

The Manhattan Rubber Mfg. Division

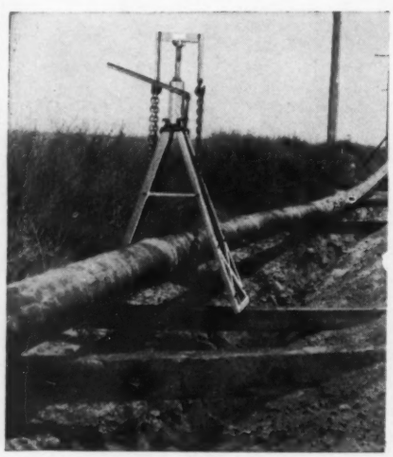
OF RAYBESTOS-MANHATTAN, INC.

Executive Offices and Factories

Passaic, New Jersey

PAYNE
ANNOUNCES
NEW
1933
PRICES
AND
MERCHANDISING
PLAN
Write us for your Copy.
PAYNE FURNACE & SUPPLY CO.
Since 1914
Beverly Hills, California

● Another Economy!
A Pipe Line Jack—Hydraulically Operated.
ONE Man Can Handle
ANY Size Pipe.



"IT'S AN ADAMS"
SAFE • ECONOMICAL
It's Low Cost Will Surprise You
Write or Phone
Adams Mfg. & Engineering Co.
Phone Kimball 3902
2068 Belgrave Ave. Los Angeles

Detroit Jewel Console, Style No. 6385

The Garland Senior Table Top, Style No. 3312

New Range Designs by Detroit-Michigan Stove Co.

DETROIT-MICHIGAN STOVE CO., Detroit, Mich., in March announced several new designs in its line of Detroit Jewel and Garland ranges.

Among the features on the Detroit Jewel are a cover for the cooking top which swings back and serves as a splasher when the range top is in use; the top burner controls are concealed by the cooking top cover when the top is not in use; a one-piece porcelain finished baking and broiler oven with all corners rounded. This feature also applies to the exterior of the range as all sharp corners have been eliminated. The cooking top is of one piece and is heavy cast iron. It is supplied in and is heavy cast iron. It is supplied in three groupings of equipment, among which are included the drawer type broiler, oven heat control, insulated oven, automatic top lighter, automatic clock control.

The new Detroit Jewel Senior Table Top is manufactured in four trims, plain ivory, plain white, ivory with green stripe, and white with black stripe. Gas controls are concealed when the cover top is down.

The Detroit Jewel Junior Table Top will occupy 36 inches floor space, but has a full 16-inch oven 20 inches deep. This model is supplied in plain white, ivory, and light brown marbleoid.

The Detroit Jewel Console is supplied in plain ivory, white, white with black stripe and ivory with green stripe, with handles to match.

The new Garland designs are manufactured in the same three styles—Senior Table Top, Junior Table Top, and Console, all having rounded corners, curved legs in two tones and full sized ovens, and may be ordered in ivory, or white, with colored trim, and in light brown marbleoid. On the Garland Table Top model the top burner controls are grouped on the front panel.

Refractory Screen Oil Gas Installation For Denver

The Public Service Co. of Colorado has contracted with the Combustion Utilities Corp. for the conversion of two 11-foot carburetted water gas sets to the Refractory Screen Oil Gas Process for the production of 1,000 B.t.u. gas for standby purposes. This conversion will increase the standby capacity of the plant.

The volumetric capacity of each set when producing 1,000 B.t.u. gas of .68 specific gravity, is rated as equivalent to that secured when producing 530 B.t.u. carburetted water gas which, in effect, doubles the thermal capacity of the units. The installed capacity of the scrubbing, condensing and purification plant equipment is similarly increased in rating. Another important factor is the quick starting characteristic of the units made possible through the use of 100 per cent oil for generation requirements instead of the use of solid fuel and oil and the attendant storage and handling problems associated with the gasification of two materials.

The gas as produced is completely interchangeable with natural gas without impairing service to customers, due to the burning characteristics of the gas which is similar to natural gas. The generating equipment can thus be used for peak load production advantageously, as well as for standby purposes.

A. H. Maeder Takes Place of Vaughn at Merriam, Kan.

A. H. Maeder has been named to fill Sam Vaughn's place as manager of Union Public Service Co., Merriam, Kan. Mr. Maeder has been superintendent of the Ozark Distributing Co., Aurora, Mo., having been transferred to that position in April 1930 from the Western Distributing Co., where he acted as superintendent of the northern district with headquarters at Sedgwick, Kan.

Ferguson and Blackburn Change Posts

L. E. Ferguson, manager for State Fuel Supply Co., Rush Springs, Okla., has been transferred to Mountain View, Okla., trading positions with G. W. Blackburn.

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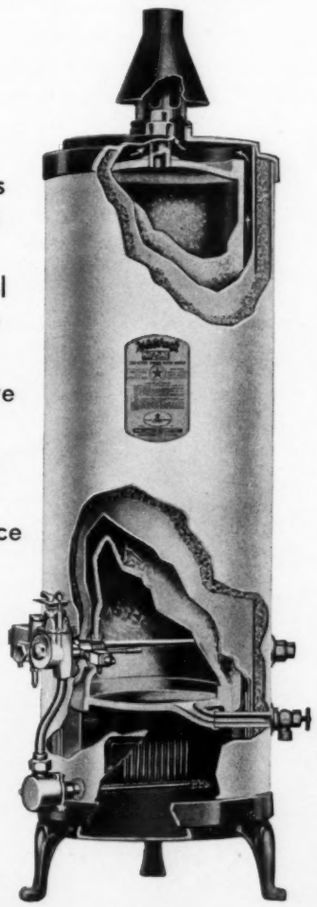

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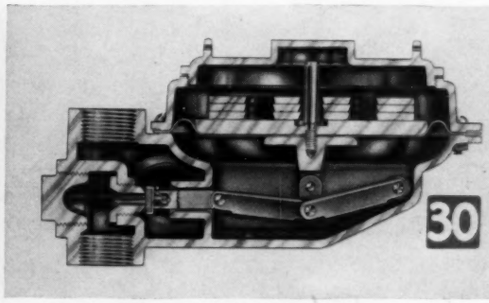

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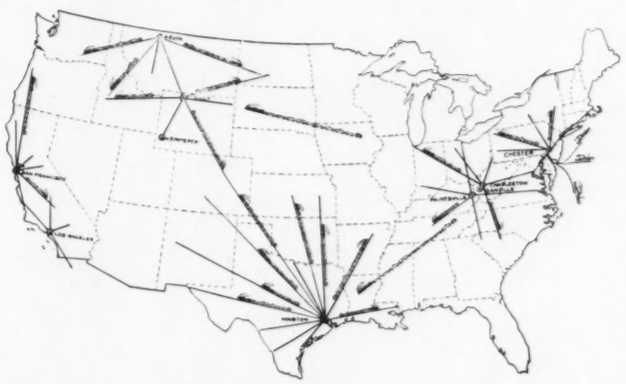

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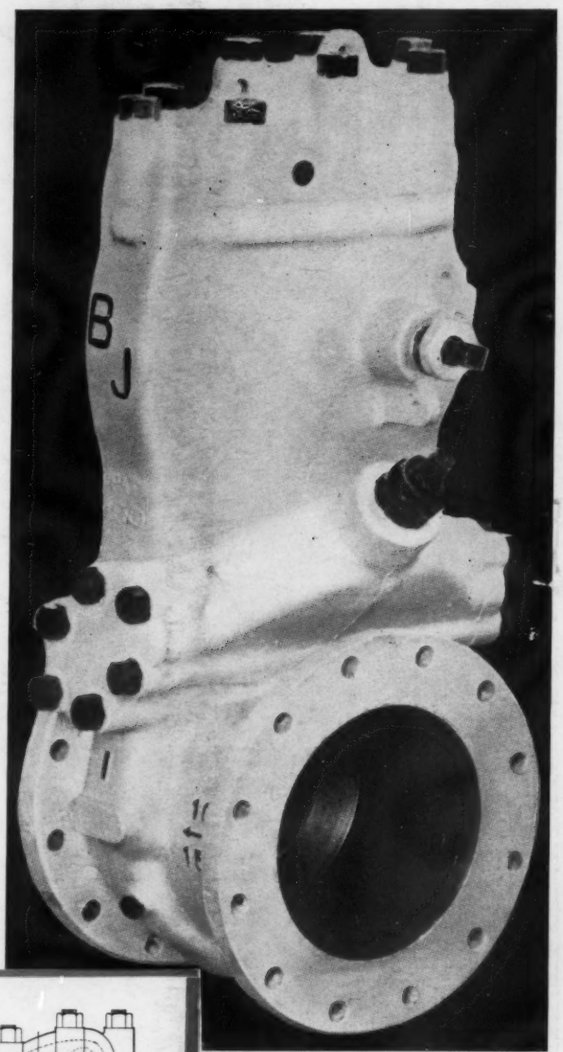

Fig. 1—The large-diameter orifice plate is being lowered into the line, with the second plate held in the upper chamber in reserve.

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Fig. 3, the top of plate is brought past center, wiping the bottom slot clean as it is centered and sealed with a positive cam-thrust action.

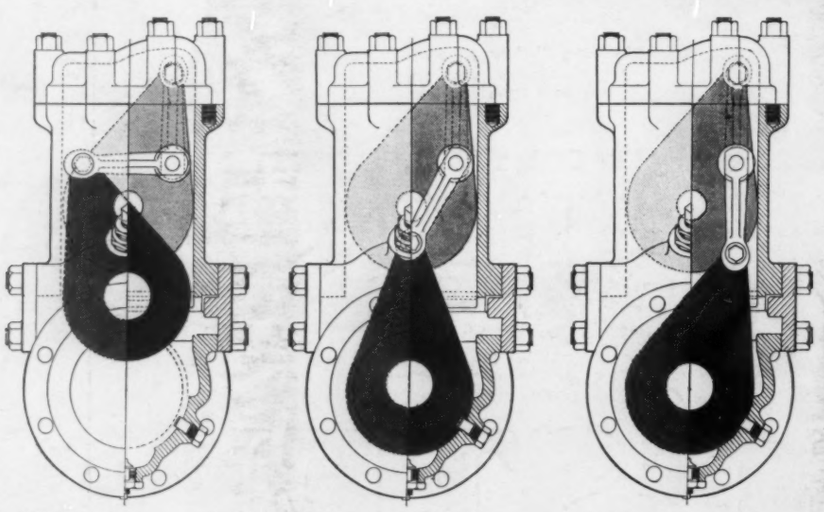

Fig. 1. Fig. 2. Fig. 3

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